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AN ANALYSIS OF THE DEATH RATE OF DETROIT*

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IN AN EXAMINATION of the death rate of the City of Detroit, the first element to be considered is that of population. In the decade 1910 to 1920 the City of Detroit more than doubled its population, increasing from 465,766 in 1910 to 993,678 in 1920. Probably no other community as large as this has ever grown to this extent in the same time. It is unnecessary, of course, in this paper to go into the reasons for this growth; we are simply considering the fact. While a large number of young mechanics were attracted to the city, there was also a large foreign immigration. This resulted in a distortion of the population when considered in relation to sex and age. In order to determine just what this distortion is, let us first consider the age and sex distribution in comparison with that of the standard million.

The first thing that will be noticed is the distribution of sex. In the standard population there should be 48.35 males to 51.65 females, but in Detroit this is completely reversed there being 54.36 males to 45.64 females. This may be represented by the ratio in the standard as 1 to 1.068 and in Detroit as 1.191 to 1.

Table 1 shows the number of the population in each age group as compared with the proportion of the standard million. It will be found that below the age of 20 there was a marked deficiency. Between the ages of 20 and 45 there was a great excess and from this age on there was a marked deficiency again. In the males it will be found that the group under 5 years of age was very nearly the standard, but that from 5 to 19 there was a considerable deficiency, amounting to almost 50 per cent in the group 10 to 14, but from the ages 20 to 55 there was a very great excess. In the 25 to 34 group this amounted to almost 84 per cent, or to put in actual figures where the standard was 75,876, the Detroit population was 139,492, an excess of 63,616. Above the age of 55 there was again a deficiency. In the female population there is a marked deficiency in all age groups under 20. Between the ages of 20 and 34 there was an excess very slight in the 20 to 24 group, but quite marked in the 25 to 34. Above the age of 25 there was a deficiency in all age groups. These are illustrated in Figures I, II and III.

As a further illustration of the age distortion of this population, attention is invited to Table II, in which comparison is made of the percentage of deaths in each age group in Detroit as compared with the percentage in the United States Registration Area in 1920. It will be

* Read before the Vital Statistics Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 21, 1925.

FIGURE I

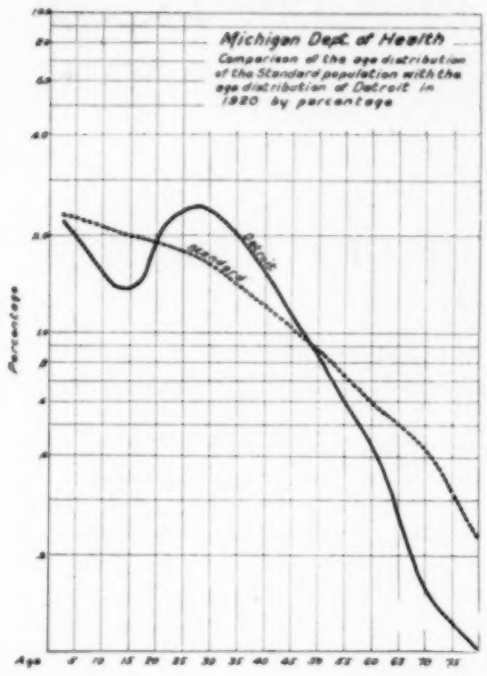

Michigan Dept. of Health
Comparison of the age distribution of the Standard population with the age distribution of Detroit in 1920 by percentage
Detroit
Standard
Percentage
Ages

FIGURE II

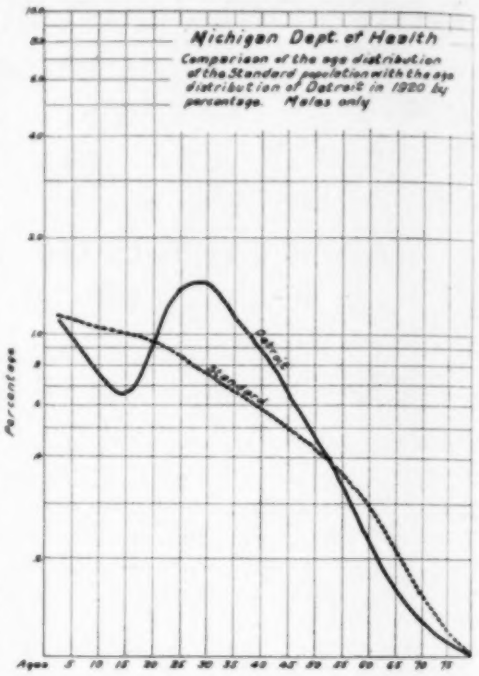

Michigan Dept. of Health
Comparison of the age distribution of the Standard population with the age distribution of Detroit in 1920 by percentage. Males only
Detroit
Standard
Percentage
Ages

TABLE I

COMPARISON OF THE AGE AND SEX DISTRIBUTION OF DETROIT (1920 CENSUS) WITH THE DISTRIBUTION OF THE STANDARD MILLION

Age	Total		Males		Females	
	Standard	Detroit	Standard	Detroit	Standard	Detroit
0–4	113,442	112,117	56,629	56,669	56,812	55,448
5–9	106,439	88,245	53,076	44,314	53,361	43,931
10–14	101,997	68,702	51,001	34,504	50,996	34,198
15–19	99,079	70,156	49,065	35,416	50,014	34,740
20–24	95,257	109,458	44,948	59,032	50,308	50,426
25–34	160,418	241,609	75,876	139,492	84,545	102,117
35–44	121,967	150,079	58,967	88,562	62,999	61,517
45–54	88,582	83,989	42,616	47,323	45,965	36,666
55–64	59,312	43,755	27,713	22,807	31,600	20,948
65–74	32,842	16,120	14,586	8,425	18,257	8,996
75 and over	13,483	8,588	5,592	3,099	7,892	4,188
Total	992,818	992,818	480,069	539,643	512,749	453,175

	Standard	Detroit
Males	480,069	539,643
Females	512,749	453,175
	992,818	992,818

observed that up to the age of 5, the percentage of deaths is continuously higher in Detroit; in the group 5 to 9 it is identical; and from 10 to 19 it is below; but from then on until the age of 60 it is very much higher. Above the age of 60 it is slightly below.

This distortion of population, naturally, radically affects the death rate and for this reason this study seemed worth while. In every statistical study we are confronted with the limitations of data and this is true in this case. No one can tell definitely the increase in the population since 1920 until the new census which was just taken shall become available, but for the purposes of this study we have taken the deaths from 1919, 1920 and 1921 and averaged them. We realize that this does not present an ideal combination because of the fact that 1919 following the influenza pandemic of 1918 naturally showed a low death rate because of the loss of the weak members of society due to the influenza of the previous year. Again, the spring of 1920 showed a recurrence of influenza with a high fatality, but in

spite of these considerations, it was deemed wise to take this group.

The number of deaths considered was 11,640 and the nativity and sex are shown in Table III.

In the Detroit population the native white of native parents comprise 31.6 per cent of the total population and the negroes 4.2 per cent. The balance of the population, 64.2 per cent, was either foreign born or native born of foreign mothers and we have learned that in relation to public health work, the first generation American, that is the native born of foreign race stocks, will present in a measure at least the thought, characteristics and instincts of the foreign stocks and for this reason the native born of foreign mothers have been considered separately so far as we have available data. In this 64.2 per cent we have foreign born 29.1 per cent, native born of foreign mothers 16.4 per cent and a third group of "mixed parentage" 18.7 per cent. This latter group has been largely omitted from the study. Table IV shows the relation of these population groups to the deaths.

It would appear from this table that the native born of native parents, the foreign born and negroes all presented death rates that were in excess of the expectancy and that the native born of foreign mothers and native born of

FIGURE III

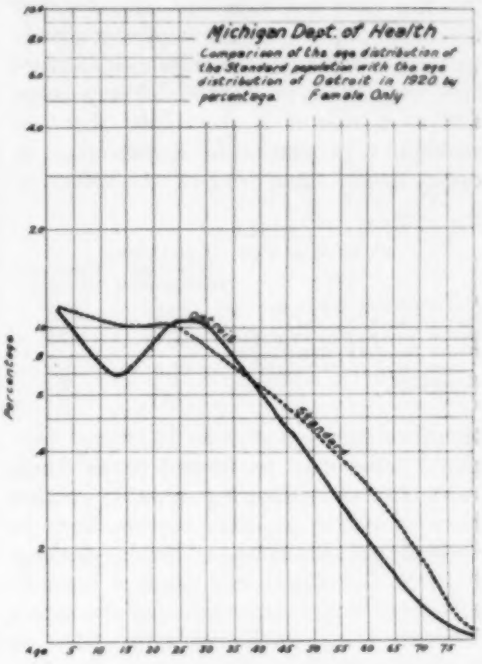

Michigan Dept. of Health
Comparison of the age distribution of the Standard population with the age distribution of Detroit in 1920 by percentage. Female Only
Percentage
Detroit
Standard

TABLE II

COMPARISON OF THE PERCENTAGE OF DEATHS BY AGE AND SEX BETWEEN THE U. S. REGISTRATION AREA AND DETROIT

Age	U. S. Registration Area			Detroit		
	Males	Females	Total	Males	Females	Total
Under 1	8.70	6.61	15.31	10.51	8.20	18.71
1	1.73	1.51	3.24	1.76	1.60	3.36
2	.78	.70	1.48	.89	.96	1.85
3	.51	.49	1.00	.55	.50	1.05
4	.39	.35	.74	.42	.42	.84
5–9	1.27	1.10	2.37	1.27	1.21	2.48
10–14	.91	.79	1.70	.78	.54	1.32
15–19	1.39	1.35	2.74	1.29	1.14	2.43
20–24	1.78	2.07	3.85	2.46	2.16	4.62
25–29	2.02	2.34	4.36	2.94	2.54	5.48
30–34	2.16	2.23	4.39	3.71	2.12	5.83
35–39	2.40	2.17	4.57	4.08	2.17	6.25
40–44	2.23	1.94	4.17	3.41	1.90	5.31
45–49	2.50	2.05	4.55	3.34	2.14	5.48
50–54	2.81	2.28	5.09	3.18	2.02	5.20
55–59	2.97	2.44	5.41	3.22	2.15	5.37
60–64	3.48	2.90	6.38	3.19	2.68	5.87
65–69	3.60	3.11	6.71	2.89	2.42	5.31
70 plus	10.77	11.17	21.94	6.13	7.10	13.23

TABLE III

SEX AND NATIVITY OF DEATHS

	Males	Females	Total
Native born of native parents	2,338	1,896	4,234
Born in Poland	399	226	625
Born in Canada	420	444	864
Born in Germany	413	328	741
All other foreign born	896	572	1,468
Native born (Mother born in Poland)	287	253	540
Native born (Mother born in Canada)	197	175	372
Native born (Mother born in Germany)	262	258	520
Native born (Mother born in all other foreign countries)	642	563	1,205
Negro	667	404	1,071

"mixed parentage" were much below, but this does not take into consideration the most important factor of age distribution. While the percentage of foreign population in Detroit is very large and as a rule it is the adults that are added to a population by immigration, in order to get some idea of the effect of this foreign population we have next prepared what may be termed crude death rates for the following groups: native born of native parents; persons born in Poland; persons born in Canada; persons born in Germany; and persons born in all other foreign countries; also, the native born of Polish mothers; native born of German mothers; native born of Canadian mothers; and for negroes. These groups have been selected because they were the only groups for which we were able to secure age and sex distribution from the Bureau of the Census. It would have added much to the value of this article if we could have used also the native born of all other foreign mothers, but this information was not available as it was concealed in the classification "Mixed Parentage." These rates are shown both for the total in the group and for each sex and will be found in Table V.

TABLE IV

RELATION OF NATIVITY TO DEATHS

	Percentage of Population	Percentage of deaths
Native born of native parents.	31.6	36.4
Foreign born	29.1	31.8
Native born of foreign mothers	16.4	12.3
Native born of "mixed parentage"	18.8	10.4
Negroes	4.2	9.2

Next we have compared age of these groups by standardizing the rates. The process of standardization adjusts the difference in age and sex distribution and it should be borne in mind that where the standardization of a rate increases the rate for the crude figures, it is due to the fact that the age distribution is more favorable toward the production of a low death rate than would be found in the standard population and where the standardized rate is lower than the crude rate, it indicates that the age distribution of the population is unfavorable toward the production of a low death rate.

The comparison of the crude and standardized rates is shown in Table VI.

In the comparison of the crude and standardized rates, it will be observed that there is a very considerable discrepancy between the crude and standardized rates. This is due, at least in a measure, to the fact that in some of the native groups, particularly in the lower ages, we are dealing with such small numbers, that the accidental variation may be very

TABLE V

SHOWING CRUDE DEATH RATES FOR EACH NATIVITY

	Males			Females			Total		
	Population	Deaths	Rate	Population	Deaths	Rate	Population	Deaths	Rate
Native	170,417	2,338	13.72	143,270	1,896	13.23	313,687	4,234	13.50
Poland	22,059	399	18.09	13,604	226	16.61	35,663	625	17.53
Canada	20,793	420	20.20	21,121	444	21.02	41,914	864	20.61
Germany	18,173	413	22.73	17,385	328	18.87	35,558	741	20.84
All other foreign	107,848	896	8.31	68,020	572	8.41	175,868	1,468	8.35
Mother (Poland)	17,105	287	16.78	17,035	253	14.85	34,140	540	15.82
Mother (Canada)	22,136	197	8.90	22,424	175	7.80	44,560	372	8.35
Mother (Germany)	41,270	262	6.35	42,442	258	6.08	83,712	520	6.21
Mother (All other foreign)	.....	642	.....	.....	563	.....	.....	1,205	.....
Negro	24,177	667	27.59	17,325	404	23.32	41,502	1,071	25.81
Not taken	95,665	...	.....	90,549	...	.....	186,214	.....	.....
	539,643	6,521	12.08	453,175	5,119	11.30	992,818	11,640	11.72

TABLE VI

COMPARISON OF THE CRUDE AND STANDARDIZED DEATH RATES

	Crude Death Rate			Standardized Rate		
	Males	Females	Total	Males	Females	Total
Native born of native parents	13.72	13.23	13.50	19.4	17.51	18.60
Born in Poland	18.09	16.61	17.53	19.0	32.85	31.00
Born in Canada	20.20	21.02	20.61	29.7	26.75	29.09
Born in Germany	22.73	18.87	20.84	7.5	7.93	8.68
All other foreign born	8.31	8.41	8.35	10.5	8.57	8.34
Mother born in Poland	16.78	14.85	15.82	45.5	11.61	41.92
Mother born in Canada	8.90	7.80	8.35	12.2	11.33	11.76
Mother born in Germany	6.35	6.08	6.21	10.2	10.39	10.47
Negro	27.59	23.32	25.81	41.0	35.26	38.26

FIGURE IV

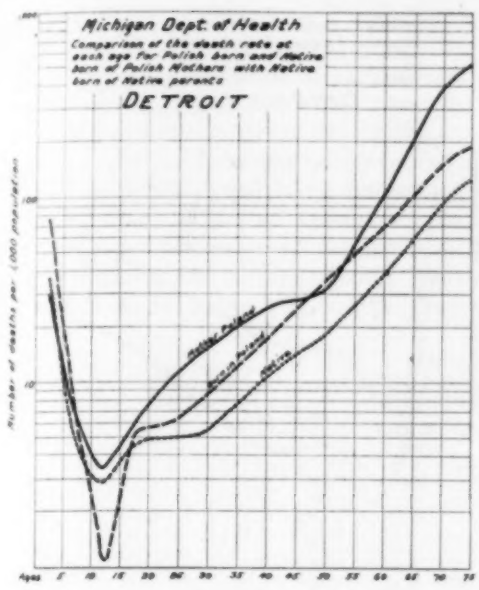
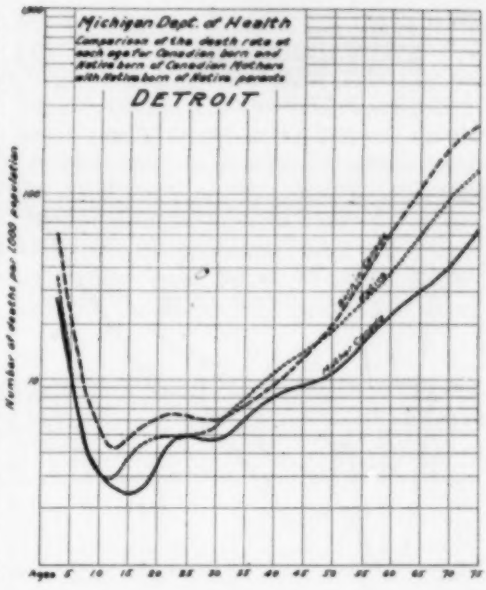

Michigan Dept. of Health
Comparison of the death rate at each age for Polish born and Native born of Polish Mothers with Native born of Native parents
DETROIT
Polish Born
Native Born of Polish Mothers
Native
Number of deaths per 1000 population
Ages

FIGURE V


Michigan Dept. of Health
Comparison of the death rate at each age for Canadian born and Native born of Canadian Mothers with Native born of Native parents
DETROIT
Native Born of Canadian Mothers
Native
Number of deaths per 1000 population
Ages

marked. In the case of the foreign born, we have a marked discrepancy in the lower ages, whereas in the case of the native born of foreign mothers, we have a normal distribution in the lower age groups, but a deficiency in the higher age groups.

It would therefore be well to standardize these in groups over the age of 25. For instance, in the German born we find a crude rate of 20.84, falling to a standardized rate of 8.68. On the other hand, if we take the group of 25 years and over, we find a rate of 25.17, falling only to 16.67. It is suggested, therefore, that if it is desired to intensify this study, that these factors be taken into consideration and also that these figures be subjected to the standard tests for dependability.

In the consideration of the specific death rates for these various groups, we have used the curve of the native white of native parents as the control and in the following charts this is shown on each one.

In the consideration of the Polish residents, Figure IV, it will be observed that in the group 10 to 14 the specific death rate for the Polish born is very much below the native born, but that in all other ages it is uniformly higher presenting the same trend. In the consideration, however, of the native born of Polish mothers between the ages of 15 and 45 this is materially higher than either the Polish born or native born. About the age of 50 it is slightly below the Polish born, but above the age of 55 it is very much higher. In the Polish born below the age of 9 the rate is materially higher than either the control or native born of Polish parents.

In the consideration of the Canadian group, Figure V, we find that native born Canadians show a much higher rate than either the control or the native born of Canadian mothers below the age of 30; between the ages of 30 and 45 it is slightly below the control but above the native born of Canadian mothers. At or about this age it again crosses the control and from then on is very much higher. In the native born of Canadian mothers the rate under 5 is quite a little below the control, and between 5 and 9 is very close to the control, from then on it is consid-

FIGURE VI

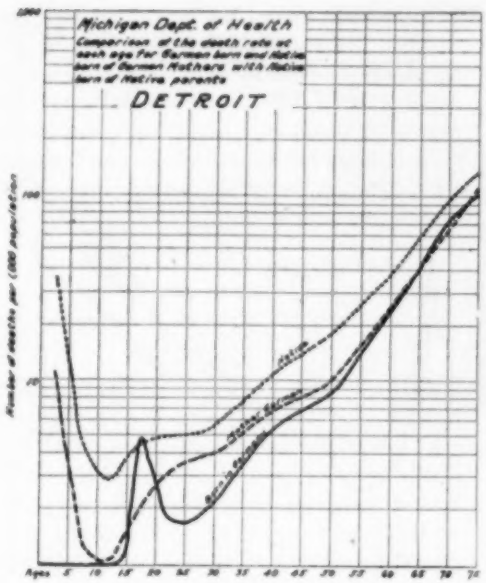
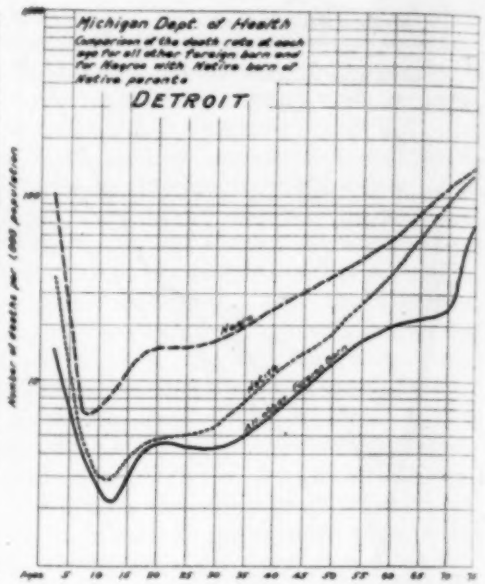


FIGURE VII



erably below, except in the group 20 to 24 where it is slightly higher, from then on it is considerably below again.

In the consideration of the German, Figure VI, there were practically no German born residents below the 15 to 19 group. At this particular point it coincides very closely with the control, but from then on it is very much lower. The native born of German mothers starts very much below in the under 5 group and is continuously below the control, but after the age of 19 is above the German born.

In the next chart, Figure VII, we show the foreign born of all other nationalities and it will be observed that this curve is continuously below the control, although in the group 5 to 9 and 20 to 24 it approaches closely, but at all other ages it is considerably below.

The negro curve which is shown on the same chart starts very much higher than the control and is notably higher at all ages.

From this finding we must conclude, then, that the Polish stock tends to increase the death rate materially at all ages. The Canadian stock which, however, is not distinctive enough in its racial characteristics to be of great value, is so closely in accord with the native stock that it will not materially affect the death rate one way or another. The German stocks on the other hand show the tendency towards the production of an exceedingly favorable rate.

It is to be regretted that the material is not available to make a more definite study of the other race stocks, but it is only possible to group them, and we must conclude that on the whole they tend toward the production of a favorable rate. The negro stock, however, is an exceedingly unfavorable one for the death rate. This, of course, is not peculiar to Detroit, as it is the history of this race wherever found, but certainly the climatic conditions must be considered an important factor in this group because of the fact that the respiratory diseases show exceedingly high rates.

A great deal of time has been spent in the study of the various diseases in their relation to these race stocks, but this introduces so many complicating factors that we are unable to reduce it to the limits of this paper. We desire to com-

ment briefly, however, on one particular disease, namely, tuberculosis.

Because all diseases have a greater or less virulence in relation to age groups, any study of any disease must consider this relation and in order to reduce this to a factor that will be easily shown and readily understood, we have determined what we have called an expectancy by taking the percentage of the population of each nationality for each age group. This is illustrated in Table VII, which gives the percentage of the population according to nativity in each age group, together with the percentage of tuberculosis deaths which occurred in this nativity and age group.

TABLE VII

PERCENTAGE OF POPULATION ACCORDING TO NATIVITY IN EACH AGE GROUP TOGETHER WITH PERCENTAGE OF TUBERCULOSIS DEATHS

Age	Native White of Native Parents		Born in Poland		Born in Canada		Born in Germany		All Other Foreign Born	
	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis
0–4	39.3	39.0	.05	.0	.52	2.7	.02	.0	.87	1.3
5–9	37.9	50.0	.55	.0	1.27	3.8	.14	.0	4.14	.0
10–14	34.9	21.4	1.4	.0	1.9	14.3	.4	.0	8.7	.0
15–19	35.3	31.1	2.0	3.3	3.1	3.3	.9	.0	12.0	16.7
20–24	36.2	33.3	3.6	1.9	4.2	2.5	1.1	.0	15.9	12.6
25–34	30.4	27.3	6.2	11.9	4.7	4.7	2.0	1.4	24.3	12.7
35–44	26.7	27.0	5.4	13.2	6.3	4.2	5.0	3.0	27.6	21.0
45–54	24.6	24.7	4.2	16.5	7.3	7.2	10.0	2.1	24.8	26.8
55–64	21.9	23.2	3.4	16.1	8.3	5.4	17.1	10.7	24.4	19.6
65 plus	47.3	21.7	4.3	.0	13.c	21.7	44.2	17.3	60.7	17.3

Age	Mother Born in Poland		Mother Born in Canada		Mother Born in Germany		Negro	
	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis	Per cent Expectancy	Tuberculosis
0–4	10.7	10.8	4.8	5.4	3.5	1.3	2.3	24.0
5–9	9.5	19.2	5.2	11.5	5.9	.0	2.5	11.5
10–14	6.5	14.3	6.6	7.2	9.7	7.2	2.8	21.4
15–19	4.2	5.6	6.6	5.6	12.5	8.9	3.9	16.7
20–24	2.3	9.4	5.1	5.0	10.6	9.4	6.1	19.5
25–34	1.2	3.6	4.3	2.9	9.6	10.4	5.4	15.5
35–44	.5	.6	3.7	4.8	8.2	6.0	5.2	14.4
45–54	.2	.0	3.1	1.0	8.9	5.1	4.0	10.3
55–64	.1	.0	2.2	.0	8.2	7.1	2.0	3.6
65 plus	.0	.0	3.3	.0	7.1	13.0	3.3	4.3

In the native white of native parents we find the rate in the group 5 to 9 to represent an excess of 32 per cent for the expectancy; in the group 35 to 64 it is just about equal to the expectancy; and at all other ages is below. In the Polish born we find in the group 25 to 34 an excess of 92 per cent above the expectancy, in the age 35 to 44, 144 per cent above the expectancy, at the age 45 to 54, 292 per cent in excess of expectancy and in the age 55 to 64, 372 per cent. In the Canadian group up to the age of 15 the rate is notably higher than the expectancy. In the group 15 to 19 only 6 per cent above; at the age of 20 to 24 it is 37 per cent below the expectancy; at the age 25 to 34 it is just the expectancy; and from 35 to 64 much below. In the German born, tuberculosis is much below the expectancy at all ages. In all other foreign groups we find that in the age 15 to 19, 39 per cent above the expectancy, and from 20 to 44 much below; at age 45 to 54 slightly higher, and above this age much below. In the case of native born of Polish mothers the rate is materially higher at all ages. In the native born of Canadian mothers up to the age of 14 the rate is higher than the expectancy; from 15 to 34 it is below, and from 35 to 44 is above. In the native born of German mothers the rate is consistently below the expectancy at all ages except in the group 25 to 34, where the excess is about 10 per cent. In negroes the rate is excessively high and far above the expectancy at all ages.

The limitations of time and of data prevent more intensive study of this subject, but we must conclude that the factor of nativity is a vital one, and in framing our immigration laws due consideration

should be given to the effect of race stocks on our public health and our death rate.

It must be realized that the characteristic of every race and every nationality is the desire to live its own life, to make its own rules and to preserve those customs and traditions which heredity has given it. The ability of a state to establish a similarity of customs, to reconcile opinions and to promote new ideals to the exclusion of those inherited and decadent, determines its health, its unity and its longevity.

The permanence of the state and the health of its people rest upon its powers of homogeneity.

DISCUSSION BY EDWIN W. KOPF, FELLOW A.P.H.A.

Dr. Deacon's paper has the notable aspect of being the first systematic attempt to set forth some of the more obvious elements of Michigan mortality since Dr. Henry Brooks Baker presented his essay on the mortality in Michigan before this Association at its annual meeting in Philadelphia, November 10, 1874. Students of public health history have often wondered why there have been so few historical and critical studies of the results of public health work in Michigan. Michigan has had, perhaps, as favorable an experience with modern public health measures as any other state in the Union, except Massachusetts. It seems desirable, therefore, to suggest that Dr. Deacon's effort will be followed shortly by historical or critical papers from his own office or from others in the Michigan Department of Health.

The paper by Dr. Henry Brooks Baker more than 50 years ago dealt particularly with a life table analysis of the Michigan death rate. He prepared the first life table for Michigan and this was one of the few tables of this sort available for American populations up to that time. The only life tables which preceded Baker's were the Wigglesworth Table (Massachusetts—1789), the Adrain Table for Philadelphia (1807), the Elliott Table for Massachusetts (1855), and the somewhat unsatisfactory table for the United States prepared by Elliott for the year 1870. Dr. Baker's effort in preparing a life table for Michigan represented rare initiative. It is regrettable that the vital statistics records for the State of Michigan for the past 50 years have not been more thoroughly exploited. Perhaps it is not too extravagant to hope that Dr. Deacon's paper is only the first of a series representing a revival of interest in localized studies of mortality, particularly for Michigan.

Dr. Deacon's display of facts on the mortality of the several race stocks constituting the Detroit population is interesting also because it is a continuation of studies which began with General Francis A. Walker's paper[1] before this Association at its annual meeting in 1873.

More than 50 years ago General Walker discussed the relations of race and mortality in the United States, using the census returns of 1870. Discussions of the racial factor in American mortality were continued in later years by Billings, Willcox, Hoffman, Bushee, Dublin and Baker, Davis and others. Dr. Deacon, therefore, has forged another link in this chain of studies of the more intimate aspects of the mortality problem in American communities. It may be well to suggest that if the data are available in Dr. Deacon's office, a study should be made of the race stock factor in mortality for the entire State of Michigan. This would supplement the studies of Dublin and Baker for the States of New York and Pennsylvania for the year 1910 and would keep alive the interest of vital statistics students in this most important aspect of American mortality.

VITAL STATISTICIANS AND THE STATE UNIVERSITIES

How, and under whose auspices these studies should be made, is another question, however. The vital statistician in the state services is necessarily an administrative officer with little time at his disposal for the effective, and, at times, exhaustive analysis of the crude tabular returns. Perhaps it would be helpful if the Michigan State Department of Health would establish coöperation with the graduate school of the University at Ann Arbor and would encourage more graduate research into the population and mortality problems of the state. A successful plan of coöperation between the State Department of Health and the university would establish what vital statisticians have hoped for so many years—

a bond between the graduate schools of our universities and the state and local registrars of vital statistics. Effective coöperation between the two groups would do more to advance the standards of vital statistics analysis and secure standing for vital statistics than perhaps any other single procedure.

Dr. Deacon's paper offers opportunity for constructive comment, especially since there seems to be an indication that this is only the first of a number of studies which Dr. Deacon has in mind either for himself or for others working with him. In Table I of his paper, he shows simply the crude figures for the population census of Detroit by sex and age, in comparison with the adjusted standard million of population of England and Wales for 1901. Even with the graph on the age distribution of the Detroit and standard million populations, it is difficult to obtain a concrete idea of the differences in the age constitutions of the two populations. It would seem that a further analytical step is justified in constructing an index of age constitution for the two populations, by sex, which would act at the same time as a condensing medium for expressing or measuring tersely the differences observed in the two age arrays. It is suggested that if further work is done on this paper, it might be possible to use Professor Pearl's[2] age constitution index.

$$\phi = S\frac{\Delta^2}{p}(M—M_p)$$

The use of this index would economize the time and attention of the reader and would make possible a comparison of the age distribution of Detroit with that for other areas in the state. The use of condensing media, such as the Pearl age constitution index, facilitates the development of something more than a vague idea of difference in so important a demographic factor as the age constitution of a population.

In Table II of his paper, Dr. Deacon gives a comparison of the percentage distribution of deaths by sex and age for the United States Registration Area and for the city of Detroit. This table is, of course, valuable as a crude descriptive statement, but because of known differences in the age constitution of the two populations and in the specific death rates for each of the age and sex classes, it is likely to be somewhat misleading. It is the sort of table which might very well be shown as an appendix to the paper. Dr. Deacon's Table III is not entirely clear. In the upper part he shows the number of deaths of persons native-born of native parentage and then shows three classes of persons born in three European countries, with a total for deaths in all other foreign countries. Farther down in the table he shows captions for persons whose mothers were born in the three specified foreign countries and a residual title "mothers born in all other foreign countries." It is not clear whether the lower three nationality classes include foreign born persons as well as native born descendants whose mothers were born in the specified countries. It will be noted, also, that the number of deaths of persons born in the specified foreign countries is, perhaps, too thin to warrant the preparation of specific death rates by age. This suggests that perhaps more stable results could be obtained if the data for the whole state were analyzed for more than the three calendar years included in the present study (1919–1921).

The classifications of population and of deaths by specific nationality suggest a difficulty which arose in the preparation of mortality tables for the states of New York and Pennsylvania in 1910. Dr. Deacon shows only three foreign countries, Poland, Canada and Germany. With respect to the classification of population and deaths under "Poland," it is presumed that the figures relate to the classification made by the Census Bureau in 1920 on a post-war basis, and that the deaths were also classified in that manner. In preparing the statistics for New York State in 1910, it was found to be rather difficult to reconcile the tabulations of population and of deaths. At that time many deaths were reported of persons born in "Poland," and there was, of course, no estimate available of the population exposed to risk in this category. It was necessary for the 1910 statistics to distribute the deaths among the categories "Germany," "Russia," and "Austria Hungary." It is by no means certain that the published classification of the American population of Polish origin for 1920 is satisfactory for the preparation of death rates for this nationality. The returns of nationality on the death certificates are open, of course, to the same objection. It may have been possible that "Germany," "Russia" or "Austria Hungary" were specified as countries of birth on some of the

death certificates where, in reality, the descendant was born within the limits of post-war Poland.

Dr. Deacon's category "born in Canada" is subject also to some qualification. It would be helpful if we knew whether the Canadian born population of Detroit was of British or of French stock. One might expect to find considerably lower death rates among British Canadians than among French Canadians. Dr. Deacon's other category, "Germany," is open also to some question because in the 1920 census the returns of population were classified, so far as practicable, to include only persons born within the limits of post-war Germany. Reporting of country of birth on the death certificates may have included quite a number of deaths which properly belonged in the classification "born in France," or in other parts of the former German Empire which were assigned to other political units after the war.

These points are made not in criticism of Dr. Deacon's paper, but as suggestions to other students who may wish to undertake similar analyses of the mortality according to country of birth of the foreign white stocks. It seems rather difficult to reconcile the classifications of the population on a post-war basis with the returns for nationality which are given on death certificates. It might be profitable if the next student undertaking a mortality study of this kind were to make an inquiry into a representative sample of death certificates, in order to determine the extent to which differences in the reporting of country of birth affect mortality tables by race stock.

In Table VI, Dr. Deacon presents a comparison of crude and standardized death rates without stating in detail the basis of standardization. This important problem arose also when the statistics were prepared for the study of the mortality of foreign race stocks in New York State in 1910. After experimenting with the standard million of population of England and Wales in 1901, it was decided to discard this basis for the adjustment of death rates and to use instead the population of native born persons of native parentage above 10 years of age for the whole of New York State in 1910. The standardization or adjustment of death rates for nationality groups as given in Dr. Deacon's paper is open to some question largely because of the small numbers of population and of deaths at specific age periods. Dr. Deacon shows, for instance, a standardized rate for all persons born in Germany of 8.68 per thousand as compared with 18.60 per thousand for persons native born of native parentage. This is rather an unexpected result.

In the paper prepared by Drs. Dublin and Baker[3] the standardized rate at ages 10 and over for German born persons was about 17 per thousand and for persons native born of native parentage it was about 13 per thousand. Dr. Deacon's findings suggest that both the population and mortality data were too scanty to warrant the preparation of specific death rates by age and the subsequent calculation of a standardized death rate at all ages. It is suggested that perhaps this rather low rate for German born persons in Detroit may be due also to the inclusion in the standard population of the numbers of population at the ages under 10 years. It might be well to suggest a recalculation of the standardized rates for the age group 10 years and over, thus eliminating the effect of a heavy "standard population" at those ages where there are few or no deaths.

In Figure VI, Dr. Deacon shows the age contour of the mortality curve for persons born in Germany and for persons whose mothers were German born. In view of the fact that there were only 741 deaths of German born persons and 520 deaths of persons whose mothers were born in Germany, which had to be distributed by age, the curves shown on Dr. Deacon's chart suggest that the data were smoothed either graphically or by formula before they were entered upon the chart. With so few deaths at all ages, one would expect a rather irregular and uncertain contour for the age curve. The small number of deaths and the relatively small population for this category might account for the apparently more favorable death rate of the Germans in Detroit when compared with the death rates for persons native born of native parentage.

In presenting comparisons of the death rate for small population groups, especially when the facts are displayed by age periods, it seems advisable to make a number of tests of the dependability of the specific death rates used in computing a standardized or adjusted death rate. It may be worth while to expend considerable effort in making these simple and productive tests of crude statisti-

cal results. This applies particularly to a subject so interesting as the differential mortality of the racial groups in the American population. Readers of Dr. Deacon's paper will recall the studies made into the mortality of race stocks in the city of Boston, first, by Dr. F. W. Bushee,[4] and later by Dr. W. H. Davis.

Students who expect to continue these several studies of the racial factor in mortality could perform the necessary tests for stability on the specific death rates reported by Drs. Bushee, Davis and Deacon. The work is rather laborious and might, in itself, become the subject of a paper before this section. It is sufficient not only to utilize the crude tabulated returns in preparing specific death rates by age and subsequently standardized or adjusted death rates, but also to provide the necessary precautionary calculations as to the extent to which the material is affected by the errors inherent in dealing with small numbers.

In closing, may I again stress the point that the descriptive and methodological criticisms which might be brought against Dr. Deacon's paper are at the present time of minor importance. The chief point which we should all bear in mind is that Dr. Deacon has taken a distinct forward step in presenting a specialized study of mortality in his state and that it gives promise of further studies from his office. Dr. Deacon's paper represents a tremendous amount of arithmetic development of the crude data and it would be asking too much to expect him to apply also those criteria of statistical analysis which have been so effectively employed by the Research Departments of our University Schools of Public Health.

For future students, however, it seems desirable to make the constructive comment that our registrars of vital statistics who plan to make studies of similar character would add tremendously to the effectiveness of their papers through coöperation with the universities. The valuable assistance which was given by Professor E. B. Wilson of the Harvard School of Public Health to Dr. J. W. Schereschewsky in the criticism and analysis of cancer statistics in the United States is an example in point. No doubt the members of this section could establish very effective coöperation with persons qualified in practical statistical criticism. We ought to invite papers prepared jointly by registrars and the statistical analysts. This would do much to enhance the value of papers prepared from the crude tabulated results by the registrars whom Dr. Deacon so aptly terms the general practitioners of vital statistics.

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The Janitor and the School Child—Under this title the Metropolitan Life Insurance Company has issued a 12-page illustrated bulletin covering the latest accepted principles on ventilation and health. It is the proposal to send a copy of this bulletin, which has been prepared by Dr. C.-E. A. Winslow, to all school janitors in the United States. (The bulletin might equally well be placed in the hands of all production managers, janitorial services and physicians and nurses connected with industrial plants.) The headings covered include: Why people catch cold, dust and disease, the real opportunity, stale air, overheating, the thermometer, regulating heat, school ventilation, simple rules for ventilation (with an illustration of the fresh air gravity exhaust method recommended by the New York Commission on Ventilation), and a final statement from the commission which reads: "The most important article of ventilating equipment is the thermometer; and however simple or complex an apparatus may be installed for air conditioning, a constant and intelligent vigilance in regard to operation and overheating is the price of health and comfort. . . . This is your opportunity."—Metropolitan Life Insurance Co., New York City.

CARBON MONOXIDE AND AUTOMOBILE EXHAUST GASES*

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THERE ARE MANY problems involved in the prevention of poisoning by carbon monoxide and automobile gases, one of the most important of which is the problem of diagnosis of carbon monoxide poisoning. We are not concerned about the cases where exposure is evident and severe symptoms or death follows. However, when exposure to limited amounts is possible we are much concerned whether such symptoms as the common ones of headache, weariness, weakness, dizziness, nausea, vomiting, loss of strength and muscular control, increased pulse and respiratory rates, loss of reflexes, and even coma with intermittent convulsions, cessation of respiration, and death[1] are due to carbon monoxide poisoning or any of the many other possible factors connected with the environment or the condition of the victim.

The presence of pallor and symptoms of anemia, but with a high hemoglobin reading, associated with polycythemia is said to constitute a characteristic diagnostic combination.[2] Direct blood tests for carbon monoxide may or may not have significance. Norris and Gettler find that 64 per cent of post-mortems of "normal cases" so far as carbon monoxide has been a factor in the cause of death show CO present to as much as 5 per cent saturation in the blood, in New York City, upon delicate tests such as that of Van Slyke as modified by O'Brien and Parker.[3] They found this test sensitive to within about 1 per cent. In deaths due to carbon monoxide, in victims found after varying periods after exposure, the CO present ranged from 10 to 92 per cent. This raises the question of the utility of delicate tests. Sayers and Yant[4] have perfected the pyrotannic acid method for practical utility purposes with a delicacy which appears to be sufficient, they consider, for all practical purposes.

One of the most characteristic post-mortem findings, when present, is the loosening of the epidermis and perhaps blisters, located usually on the extremities and about the face and neck. Death from no other cause appears to show such phenomena. Associated with this is the occasional appearance, in those who survive a serious exposure, of gangrenous areas which may later take life through depletion or secondary infection.

We have been accustomed to lay great stress upon red discolorations of the body and blood just preceding and following death, but recently Banham, Haldane and Savage[5] have pointed out the possibility of confusion with nitric-oxide hemoglobin, not from the administration of this compound as nitrites, etc., but from the presence of a nitrifying organism which may cause the body to have a red color similar to that often found in carbon monoxide poisoning. Such symptoms and causative organism were found in a case dying of broncho-pneumonia. These authors insist that CO-hemoglobin may be differentiated from NO-hemoglobin by the fact that on great dilution with water the former stays pink while the latter is

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not so pink, while boiling gives a grey coagulum with CO-hemoglobin but a pink coagulum with NO-hemoglobin. They regard this as the simplest and most delicate means of detecting the presence of CO in the blood and of differentiating it from other colored blood solutions.

DELAYED TYPE

Our second problem concerns the question of serious or fatal consequences of delayed type following soon after an alleged exposure in which the victim has been able to extricate himself from the CO environment of his own volition. For example, he leaves the mine, furnace room, garage or similar place experiencing a shortness of breath; goes home, utilizing a period of 20 minutes to an hour; gets gradually more dyspneic and dies with evidences of acute cardiac dilation within 1 to 4 days; or develops a severe form of broncho-pneumonia which is usually fatal. A typical case is presented by Dr. J. M. Thorne.[6] Does this constitute delayed carbon monoxide poisoning? If other workers under similar circumstances experience no such symptoms, or allowing that they have symptoms of headache and a little slowing up of activity, may the fatality still be due to carbon monoxide poisoning? Are we justified in labeling a death as due to carbon monoxide poisoning when the individual is not prostrated or rendered unconscious *at the place of exposure?* These are all important practical questions in compensation matters regarding exposures to carbon monoxide.

POSSIBLE LATE SEQUELAE

Four prominent afflictions alleged to be due to breathing carbon monoxide in amounts producing semi-consciousness to just short of death, and either in one or multiple exposures, present themselves. Usually there has remained a degree of ill health perhaps not affecting work ability in the interim before the alleged sequelae develop. These sequelae are (a) the development of serious pulmonary complications like pneumonia some weeks or months afterwards; (b) the development of multiple sclerosis usually some years afterwards; (c) the question of pernicious anemia, recently reëmphasized by Beck and Fort,[2] following in due course of time and usually after repeated exposures; and (d) the question of psychoses or, simply, psychasthenia and neurasthenia developing months or years after exposure. May these afflictions really occur as late sequelae of carbon monoxide inhalations? Remember, we are not considering immediate or early sequelae here following exposures, nor situations in which various disabling complications continue to exist after rescue until one or another of these sequelae eventuates.

ASPHYXIA

Does asphyxia explain all of the phenomena of carbon monoxide poisoning? If carbon monoxide poisoning simulates the gradual withdrawal of oxygen from the blood, or the tenuity of the atmosphere as one ascends to great heights in aviation or in mountain climbing, as is claimed by most authorities, how do we explain the fact that in acute cases of poisoning, such as occur within a few minutes' exposure in a closed garage or a few hours' exposure to the fumes of a maladjusted gas heating stove, *nervous symptoms* such as weakness of the knees, faintness, and loss of consciousness invariably *occur before respiratory symptoms* such as shortness of breath, rapid breathing, cyanosis, and similar phenomena usually associated with asphyxia or air hunger?

In this connection we are much interested in a recent paper by Barcroft to the effect that in death by carbon monoxide in animals, although the blood in the general circulation contains a very high percentage, that in the spleen contains practically none. When carbon monoxide eventually reaches the spleen it is retained much longer than in the general circulation. (Note here the value of

examining the spleen for CO in post-mortems.) Barcroft states that unless CO reaches more than 20 per cent saturation in the resting animal it may not penetrate the spleen pulp, which remains entirely free from the gas for as much as 4 hours. This discovery has offered one of the best explanations for the function of this mysterious organ—that of a storehouse for surplus blood corpuscles which are called into use only on extra demands. In active animals the CO-hemoglobin penetrates at once into the spleen pulp so as to be noticeable within 5 minutes. Splenectomized animals die markedly sooner under carbon monoxide than do controls. Thus the spleen appears to be a reservoir for blood corpuscles to be put into the circulation as required, and the old saying "to vent one's spleen" has an intelligible meaning.[7]

A DISEASE OR AN ACCIDENT

Is carbon monoxide poisoning a disease or an accident? Do small amounts produce any disease? If acclimation takes place in those who do not show very noticeable symptoms, may gradual disease nevertheless take place? (Obviously where complications or sequelae immediately follow a given exposure, the case is an accident, that is, an event fixed in time as well as in place.) Our general belief is that any disability consequent upon the breathing of carbon monoxide has followed an exposure producing complete inertia if not unconsciousness and therefore can be fixed in time of occurrence. Hence such a disability does not constitute a disease but the result of an accident. Therefore chronic poisoning from a single exposure to carbon monoxide does not exist; persons who have not been noticeably damaged by a single exposure (unconsciousness, paralysis, acute cardiac dilation, etc.) recover from all symptoms within a few moments and no disease is known to follow. We may be wrong in this, but if not, then carbon monoxide poisoning should be removed from occupational disease schedules and put into accident schedules. The same should be said for caisson disease (compressed air illness) which is apparently always an injury and not a disease. Is our nomenclature garbled?

CARBON MONOXIDE-HEMOGLOBIN DURING SMOKING

Numerous investigators have found CO-hemoglobin present in one's blood during the smoking of an ordinary cigarette, pipe, or cigar. Incomplete combustion, *i.e.*, carbon monoxide, results from pulling air *down* through the fuel bed of the burning tobacco, because of poor aeration there. Several per cent of CO may occur in undiluted smoke from cigars.[8] Naturally, those who inhale show the most in the blood. Quantities ranging from 5 per cent to 22 per cent CO-hemoglobin have been reported in smokers. The question arises whether this produces any chronic disease, whether acclimatization does not take place in the habitual smoker, and whether, in the end, smoking is not a form of exercise similar to walking at 3 to 4 miles per hour, so far as the CO factor in burning tobacco is concerned. If it is true that these rather significant amounts which occur in smokers do no harm, do similar amounts which occur in garage workers or perhaps traffic policemen, etc.?

A PROBLEM IN MINES

We find that many are under a misapprehension as to carbon monoxide as a mine problem. It should be emphasized that carbon monoxide is not a normal or natural gas in subterranean spaces. It is always the more or less immediate result of a fire, and that fire has burned without sufficient oxygen; so that whenever carbon monoxide occurs in a mine, it is necessarily the result of blasting in poorly ventilated quarters, or of fires, usually of smoldering type located about the passageways. Carbon monoxide does not occur naturally anywhere, volcanoes and fumaroles excepted. For this reason it should be pointed out that some other gas,

usually carbon dioxide, or a plain want of oxygen, has been the "gas" responsible for the mishap in a sudden asphyxiation in a closed or deep space, rather than carbon monoxide. This item should not be closed without calling attention to the perfection of the "carbon monoxide self rescuer" devised by Fieldner, Katz and Reynolds[9] which may be held in the rescuer's teeth and provides protection from this gas for at least one-half hour while helping miners to escape from places in which fires are burning or explosions have occurred.

GAS-FIRED HEATERS

We present herewith a table showing the carbon monoxide fatalities which have occurred in Ohio during the past three winters, due to gas-fired heating appliances used in occupied rooms, although those of the first winter, 1922–23, were not recorded systematically until January, 1923. We believe that the considerable falling off in deaths from gas-fired room heaters last winter (1924–1925) is the result of the vigorous campaign of publicity instituted, in which all were strongly advised to see that such heaters were connected to effective chimney flues. It will be noted that gas-fired water heaters, usually used in bathrooms and much more difficult to connect with flues, have taken a small but constant toll each winter. There is also a surprising increase in asphyxiations from automobile exhausts.

CARBON MONOXIDE FATALITIES
Three-Year Comparative Record in Ohio
(Compiled by Ohio Dept. of Health)

	Winter 1922-23 Deaths	Winter 1923-24 Deaths	Winter 1924-25 Deaths
Gas-fired room heaters	41	43	23
Gas-fired cooking stoves	2	3	8
Gas-fired water heaters	5	4	5
Hotplates	1	1	0
Furnaces (gas and coal) and stoves (coal)	6	6	2
Automobile exhaust	5	7	20
Total	60	64	58

As a considerable part of the gas used in Ohio is natural gas and contains no carbon monoxide, it is easy to see that carbon monoxide poisoning has occurred as the *result of the burning of the gas.* This sometimes occurs from improperly constructed heaters, which are constant carbon monoxide generators from the moment they are lighted, sometimes from burning the heaters too high, and sometimes from a rise in the gas pressure, particularly over night while one is asleep and while less gas is being used in the neighborhood—which allows a certain amount of the gas to slip through the heater only partially burned (*i.e.*, as carbon monoxide) and without reaching a temperature of 1100° F., which our metallurgists claim is the temperature necessary to burn or oxidize carbon monoxide completely to carbon dioxide.[10, 11, 12]

The chief problem here is the creation of city ordinances and of state laws prohibiting the flueless heater as well as the abolition of leaky gas tubing and the control of leaky connections.

OTHER DANGEROUS COMBUSTION PRODUCTS

The question arises whether other injurious products are given off than carbon monoxide from carboniferous fuels in heating stoves. One set of chemical analyses made at Ohio State University shows that under ideal combustion, over 6 per cent carbon dioxide and less than 10 per cent of oxygen constitute the combustion products of a high class gas-stove heater. This is a chemical condition incompatible with life for the average human being. In addition to this, we strongly suspect that other sharp and offensive substances may gradually debilitate human beings, *i.e.*, lower their resistance, especially to diseases of the respiratory tract. The other substances found are said to be formaldehyde, acrolein, ammonia, and sulphurous products.[13] All carbon fuel appliances should be effectively vented to the exterior and so constructed as not to endanger life or health. The U. S. Bureau of Standards has laid down the principles which should be followed in the construction of air-gas burners to insure complete combustion and thereby avoid carbon monoxide and other menacing by-products.[10]

AUTOMOBILE EXHAUSTS

It has been pointed out that statistics on fatalities from inhaling carbon monoxide in automobile exhausts, while limited in absolute figures, show an apparent decided increase in the state of Ohio. The question has been raised by a certain motor corporation in New York City whether this may not be due to the use of wet rather than dry mixtures said to obtain in Ford, Maxwell, Chevrolet, Dodge and other makes of cars, usually the cheaper ones, and not in dry mixtures which commonly obtain in the higher priced cars. So much insistence has been made upon this point to public health officials by this corporation that we addressed a letter upon the subject to the U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa., some of whose statistics are quoted by Mr. Deppé, and we received the information following:

"From the same 101 automobile tests which were made under my direction at Pittsburgh and which Mr. Deppé quotes in his letter of August 6 to the Society of Automotive Engineers we found no appreciable difference in the relative amount of CO traceable to using easily vaporized or difficultly vaporized gasoline. We found that the amount of CO was directly proportional to the richness of the mixture. If we adjusted the carbureter so as to give a lean mixture the CO was low—in the neighborhood of 1 per cent; if the carbureter was adjusted rich it was in the neighborhood of 10 per cent. We could get just as low CO in a Ford as in any other car. There seemed to be little practical advantage on this score in any one make of car or any one time of mixture." Whether wet or dry, "if the mixture is rich it is bound to contain large quantities of CO."

Hence we have not considered it worth while to collect statistics on the types of automobiles associated with CO fatalities in Ohio.

We have been struck, of late, by the evidently successful attempts at suicide reported to us by means of the automobile exhaust method. It is only necessary to mention furthermore the rather frequent occurrence of narrow escapes and fatalities due to exhaust gases permeating enclosed cars and, in some instances, autobuses, so that ordinances have already been passed by a number of cities covering the proper ventilation of automobile vehicles used by the public.

TETRA-ETHYL LEAD POISONING FROM AUTOMOBILE EXHAUSTS

The title of this paper does not permit a discussion of the subject of poisoning by ethyl gasoline in its manufacture or distribution. The public is quite familiar with the mishaps which have occurred in New Jersey and Ohio in connection with the manufacture and blending, respectively, of tetra-ethyl lead. Contrary to popular opinion, there have been no reports of fatalities and, so far as we have been able to learn, of mishaps of moment which have occurred, outside of the laboratory, due to the handling of this substance dissolved in gasoline, *i.e.*, in handling "ethyl gasoline."

While a possible hazard may still exist for auto filling station employes in dispensing ethyl gasoline, although it is no longer made by them, but at the bulk distributing centers—and perhaps to individuals careless in its use—the big problem of interest to the public is the question of the possibility of chronic lead poisoning from the inhalation of *automobile exhaust fumes* from burning "ethyl gasoline."

As you well know a general conference was called on this subject by the Surgeon General of the Public Health Service on May 20, 1925, where it was decided that not enough evidence was presented on either side of the question and that a special Committee of Seven should be appointed by the Surgeon General to investigate the subject further, a report to be made during January, 1926. In the meantime the Ethyl Gasoline Corporation voluntarily stopped the sale of the substance, which has later been modified in that the Surgeon General's Committee has authorized its sale under careful supervision by the Public Health Service in order to gain experience, as we under-

stand it, through the observation of gasoline filling station employes in certain states and limited territories. This supervised investigation is now going on in Ohio and perhaps elsewhere.

At the Washington conference it was pointed out by prominent public health leaders that authorities could not proceed to ban a substance alleged to be dangerous without sufficient evidence of danger to the public and that the results of animal experiments alone would never satisfy them; also that the feasibility of close observation on exposed human beings was entirely practical.

At this date it is truly remarkable, when we consider all of the complaints which come to the notice of health departments, particularly following the publicity of an alleged hazard to the public, that not a single one concerning gasoline treated with tetra-ethyl lead or alleged lead poisoning from motor exhausts using the same has been reported in Ohio. An invitation to the public to make such reports began immediately upon the occurrence of the mishaps at the Bayway plant of the Standard Oil Corporation in New Jersey approximately a year ago.

In view of the extensive experiments with automobile exhausts carried out upon animals by Dr. Sayers and his associates at the U. S. Bureau of Mines Experiment Station in Pittsburgh for approximately a year and a half, *i.e.*, ending May 20, 1925, it is not likely that lead poisoning may be feared by the public. Dr. Sayers reported at the Surgeon General's conference that where the ethyl gasoline contained the regular or normal amount of tetra-ethyl lead, animals exposed 188 times to exhaust gases from an engine during a period of about 8 months and for 3-hour and 6-hour periods each day, no symptoms usually associated with lead poisoning occurred and that chemical analyses of animals gave no evidence of lead storage in their bodies. Where the amounts of gasoline contained 5 times the normal or commercial amount of ethyl fluid, a large group of animals, many of which had been used in the previous 188 days' experiment, still showed no symptoms usually associated with lead poisoning, but some of them showed storage in their tissues. Thus this situation stands until more information appears. We know of no other experiments upon this phase of the subject. Final reports of experiments conducted by the Bureau of Mines Experiment Station have not yet come to hand. We understand that the question of possible lowered resistance from the inhalation of such fumes in motor exhausts may be a part of the final report.

It is safe to say that none of us prefer to hazard lead in our systems if it is possible to prevent same. If, however, there is a certain negotiable amount which can be handled without accumulation and subsequent ill effects on health, and such an amount is absolutely indispensable if the economics of automotive transportation is to progress, we may have to tolerate the situation very much the same as we have to tolerate the automobile situation in general, and in spite of its manifold evils. The rational attitude of the present day is complete publicity and education regarding our manifold hazards so that legislative and official bodies may perfect and administer regulations for safety.

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SURVEY OF CITIES BY THE UNITED STATES PUBLIC HEALTH SERVICE*

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AMONG THE DUTIES imposed upon the Public Health Service by law are: coöperation with state and local authorities in measures for the suppression of disease; the publication of information on the prevalence of disease in the United States and other countries; and, in the field of scientific research, the broad duty of investigating the diseases of man and conditions influencing them, and of publishing the results of such investigations. It is evident that studies of the organization and work of state and local authorities are included in the duties thus defined, both as a necessary adjunct to effective coöperation and as an important item of research in matters affecting the public health. Consequently, with the approval of successive administrations and congresses, the Public Health Service has for many years been actively engaged in studies of this character.

Leaving aside those studies which are concerned more or less directly with special functions of administrative health organizations, as for instance studies of school hygiene, industrial hygiene, malaria control, water supplies, milk supplies, etc., the principal studies referring to state and local organizations as such have been:

1. Compilations and analyses of state laws and regulations pertaining to the organization and duties of state boards of health and to their work in special fields, as in the reporting and control of communicable diseases, the regulation of stream pollution, etc.

2. The current collection and publication of newly enacted state and municipal laws and regulations and of court decisions pertaining to the public health.

3. Surveys of state and municipal health departments, undertaken by special request of the state and local authorities. These surveys which constituted an especially important part in the program of the Public Health Service from 1914 until they were interrupted by the World War in 1917, have not been numerous in proportion to the total number of states and large cities in the country; but they have been sufficient to give a fair picture of typical organizations. They have, moreover, been especially productive of results because they have almost invariably been made with a view to specific recommendations for contemplated reorganization.

4. Studies of rural health organization. These have been pursued chiefly in connection with the actual establishment and operation of county health units, in cooperation with state and local authorities; but their chief purpose has been the study and development of effective organizations and methods.

It has long been evident that in addition to these intensive studies of more or less typical state, municipal and rural organizations, there was need for more comprehensive and systematic, but necessarily less detailed, studies of the status of such organizations in the country as a whole; such a collection and summary of facts as would serve for comparisons between different communities and would indicate the trend and extent of growth

* Read at the Fifth General Session of the American Public Health Association at the Fifty-fourth Annual Meeting, St. Louis, Mo., October 21, 1925.

from year to year or from decade to decade. Therefore, when such a survey of the larger American cities was inaugurated in 1920 by the American Public Health Association through its Committee on Municipal Health Department Practice, it was entirely in accordance with the established policy of the Public Health Service to accede to the request of the committee to assist in the undertaking by assigning several officers of the Service to make certain of the surveys and by publishing the committee's report as *Public Health Bulletin No. 136.*

In 1923 when the American Public Health Association decided, after publication of the committee's report on the first survey, to continue its active interest in the study and development of municipal health department practice, the Public Health Service again readily agreed to enter into coöperative arrangement whereby the work both of the Service and of the Association might be made more effective.

The coöperative agreement with reference to this survey is briefly as follows:

1. That the Public Health Service should establish an organization for the study of health department practice, specifically for making the requisite surveys and for presentation of the facts thus collected to health officers and others interested, through published reports and through special correspondence.

2. That in addition to this the Public Health Service should make the crude data collected available to the American Public Health Association for use in connection with the Association's program for the development of improved municipal health service. Subsequently the data were made similarly available to the other agencies included in the National Health Council for their special purposes.

3. That the American Public Health Association and other agencies represented in the undertaking should assist the Public Health Service in planning its surveys and in preparing the data for publication.

From the standpoint of the Public Health Service this arrangement is distinctly advantageous as assuring to the Service the active interest and coöperation of the health officers of the country whom these organizations represent; also as enlisting the services of a group of able and experienced sanitarians, both in the planning and conduct of surveys and in the laborious work of compiling and preparing for publication the great mass of data collected. From the standpoint of the unofficial agencies which are participating, the coöperation would appear to be advantageous as furnishing them with useful data which could be independently collected only at considerable expense. Finally, from the broader standpoint of the public interest, such coöperation between the Public Health Service and unofficial agencies is distinctly advantageous because it results in more extensive, more thorough and more expeditious work than could be accomplished by the same agencies working altogether independently.

It is not the purpose of this paper to discuss in detail the work which is now in progress under this general plan. Details of its scope and organization and of the progress made have already been given by the officer in immediate charge of the work, in papers presented before this Association in preceding years, and in the annual reports of the Service. All that needs be given here then is a brief review.

As at present organized, the work is under the direction of Surgeon Paul Preble, an officer selected for this duty because of his previous experience, interest and ability in studies of public healtlh organization. His headquarters are for the time being established in Baltimore.

The first work undertaken and which is still in progress, is a study of the organization and activities of municipal health departments and unofficial public health agencies in 100 cities of more than 70,000 population. This group of cities

was chosen because it is in the larger cities that public health functions have been most fully developed and because it is to these that the smaller cities usually look for their guidance; also because it was thought that it would be profitable to supplement the survey of 1920 by a second survey, covering the same cities, to measure progress. Still another consideration was that the American Child Health Association was at the same time beginning a survey of smaller cities on a generally similar plan.

The actual surveys were begun early in 1924, and completed before the end of that year. They have been made in part by Dr. Preble and his staff, but chiefly by other officers of the Service stationed in or near the cities to be surveyed. The schedule used in making these surveys was prepared by Dr. Preble after consultation with the American Public Health Association Committee on Municipal Health Department Practice and other interested agencies, with a view to including in it as much as possible of the special information desired by these agencies for their own special studies.

The data thus collected are being compiled and analyzed by a group of 18 authors, each of whom has undertaken to prepare one or more sections of a comprehensive report. These authors are for the most part representatives of the American Public Health Association and other public health organizations, and are recognized leaders in their respective fields. Arrangements for their collaboration have been made largely through the Committee on Municipal Health Department Practice, which has given active assistance in organization of the work, in enlisting the services of able authors and in providing each of them with a photostat copy of the required sections of the original survey records. This committee has also agreed to assist in the final assembly, review and editing of the various sections.

The service rendered by this group of collaborators who have undertaken such a laborious task solely because of their interest in the subject is invaluable. Not only does it expedite the publication of a report which would otherwise be several years in praparation, but what is of more importance it brings to the analysis of the data the abilities and experience of a group of authors who are thoroughly representative of the best of public health work in all its phases. It is a pleasure to acknowledge to these authors and to the oganizations which they represent the appreciation of the Public Health Service for their generous assistance.

Pending the publication of this report, and supplementing it, Dr. Preble's office is offering a special information service to health officers, furnishing them on request compilations of data which have been prepared but not yet published, or special compilations where these are called for and where they can be made without prohibitive labor and expense. It was believed, when this service was established, that it would be of real value to health officers and others who were interested in the study of municipal health department practice from various angles. It must be admitted, however, that although the offer of this service has been made repeatedly in publications and in circular letters, there has been surprisingly little call for it.

As it is impossible, even in such a comprehensive report as is now being prepared to utilize all of the great mass of data which have been collected, the original records of the surveys have been made available to any of the coöperating agencies which may wish to use them and may be willing to go to the comparatively slight expense of copying or abstracting them from the original records. The American Public Health Association has thus been furnished, at its own expense, with photostat copies of the original survey records for use in connection with its field service and in its program of developing municipal health department practice. It is hoped that in the future

the other agencies which were concerned in the original coöperative agreement will likewise avail themselves fully of the data, either directly from the Public Health Service or from the American Public Health Association, for it is only through analysis and presentation from various points of view that the potential value of the facts can be fully realized.

A complete program of study adequate to furnish the information requisite for progressive improvement of public health practice cannot be limited to broad general surveys. It must include also a proper proportion of more intensive and critical studies, each limited perhaps to a small number of representative organizations or to the more detailed study of one particular function. It must also provide for active coöperation with state and local authorities in the study and solution of their peculiar local problems as they arise. No choice can be made between these several classes of investigation on the basis of their relative importance since all are necessary in a balanced program. So far as the Public Health Service is concerned, the choice must be determined largely by the extent and kind of work being done by other agencies, the function of the Public Health Service being to furnish the kind of information which is most useful to supplement that which is available from other sources. Therefore, the extent to which the Public Health Service will develop its work in general surveys of municipal, county and state organizations depends entirely upon the demand for this particular kind of information from the sanitarians of the country, as expressed chiefly through the American Public Health Association and other representative organizations having a direct and active interest in the development of public health practice. To the extent that such a demand develops and continues the Public Health Service will endeavor to meet it by adequate extension of the service which has already been established.

Summer Course in Public Health Law—For the third consecutive year, the summer courses at Columbia University, New York, will include lectures on public health law. These will be given from July 6 to 16 for 1 hour daily from 1 to 2 P.M. These ten exercises will count as 1 point and will cost the student $10 tuition fee. Persons interested in this and other public health courses at Columbia University this summer should write to the Director of the Summer Session.

Please Mail a Copy to Yourself at Your Home—If you roll your calendar or your mimeographed bulletin or your printed monthly please put yourself on the mailing list. Then when the first copy arrives try to unroll it so that it can be read with ease. Doesn't it look like a fright? I will promise to unroll the stuff but in the process I'll earn all that I get from reading it through in its crooked, twisted form. E. G. R.

The Under-rested Child—A recent article on the value of sufficient rest for children says there are certain well defined signs of the failure to secure adequate rest and recuperation, namely, failure to gain weight, fatigue posture and irritability.

The author observes that these under-rested children are notoriously irregular in habits of eating, sleeping and elimination. They belong among the cases lumped together under the name of malnutrition. They are responsive to medication, changes of diet, scene and climate, but most of all to an increase of the time allotted to recuperation. In some ways the hardest thing to obtain, rest, is the most fruitful of the means which can be used to build up and restore the frail and irritable child. Failure to obtain sufficient rest in an age so full of shocks and wonders is sufficient explanation for much which passes by the names of malnutrition and nervousness.—*Arch. Pediat.*, Dec., 1925.

THE OUTBREAK OF BOTULINUS POISONING IN SOLON, OHIO*

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THREE PERSONS of Solon, Cuyahoga County, Ohio, a mother aged 43, a son aged 22, and a daughter aged 15, ate of the contents of a just-previously-opened can of sardines in tomato sauce on June 15, 1925. The can had been purchased 2 days previously at a chain grocery store in a nearby town. Its contents were not cooked or heated before serving. The daughter developed symptoms of botulinus poisoning within about 36 hours and died of the same in approximately 100 hours. The mother developed similar symptoms within about 42 hours and died of the same 17 days later. The son, who barely sampled the contents of the can in question, developed no symptoms. The uneaten portion was fed to the family dog which apparently vomited it but showed no ill consequences.

The can in question was reported to have been swelled, when opened to have spurted over the immediate surroundings including the dress of the daughter who opened it, to have had a "rotten" odor and, at least to the son, a disagreeable taste. A double portion was eaten by the daughter, including most of the liquid part and 1 portion by the mother. The can itself was first discarded and then recovered from the garbage pile by members of the family 3 or 4 days after the date of the meal in question.

Dried scrapings from the recovered can, obtained on July 10, 1925, 25 days after it had been opened, emptied and discarded, amounted to two-thirds of a teaspoonful. Bacteriological examinations of these scrapings were reported positive for botulinus toxin by 3 different laboratories, *viz.*, Professor E. O. Jordan, University of Chicago, Professor W. A. Starin and Fred Berry, Columbus, Ohio, and the Microbiological Laboratory of the U. S. Bureau of Chemistry through the Cincinnati Station. The first 2 of these laboratories also identified the toxin as *type A. botulinus.*†

SYMPTOMS OF POISONING

The symptoms and signs suffered by the victims were quite typical of botulinus poisoning, *i.e.*, gradual development of motor paralysis of certain cranial nerves (3rd, 6th, 7th, laryngeal branch of the 10th, the 11th and the 12th—evidenced first by disturbance in vision, followed with slight nausea, a little vomiting in the first victim, obstinate constipation, inability to swallow, impairment of speech, etc.), with accompanying marked general weakness and anxiety, but without noteworthy gastro-intestinal, respiratory, circulatory or other manifestations. The victims suffered no chills, fever, particular sleep disturbances, pain, headache, impaired consciousness nor urinary disturbances. The reflexes of both upper and lower extremities were gone. No autopsies were held.

It may be considered rather remarkable in this outbreak that a third person who sampled a serving from the can in

* Summary of the official report to the State Department of Health.

† Report of completion of typing had not been received from the third laboratory at the time of the writing hereof, September 21, 1925.

question and actually swallowed 2 small bits, developed no symptoms of poisoning. He, however, claims that he ate only bits of solid portions of the sardine meat, refusing to eat more because he feared spoilage and in all probability he thus avoided ingesting any of the toxin whose distribution was probably confined to the more liquid portions of the contents of the can.

Other cans from the same dozen obtained at the grocery store where the spoiled can was purchased were noticeably bulged on one side, enough to classify them, undoubtedly, as "flippers" or "springers." One of these examined in Chicago by Professor Jordan proved sterile; another examined in Columbus by Starin and Berry also proved sterile; a third which was delivered to the local sanitary officer for analysis by the Cuyahoga County Health Laboratory had not been reported at the time of this writing.

Reports from the U. S. Bureau of Chemistry which examined some 200 "flippers" or "springers" from the same pack, state that the same were sterile, but the bureau also found that 4 out of 9 cans which were actual "swells" contained botulinus poison.

BOTULINUS TOXIN IN SWELLED CANS

From the above, therefore, the outbreak of botulism in question—fortunately for the public, limited to 2 persons only *—may be considered as having all of the desired evidence present to establish scientifically the exact nature and immediate source of intoxication, *viz.*, the usual evidence of spoilage, serving without previous heating, the typical clinical history and symptomatology (perhaps somewhat modified in that 1 person who "sampled" a portion escaped), the agreement in widely separated laboratories as to the specific bacteriological findings in a recovered remnant, including even typing, and the fact that other swelled cans from the same pack were also found to contain botulinus toxin. Whether the ultimate source of these soil organisms in this fish pack was from the tomatoes used, and what possible slip occurred in packing, is not brought out in this investigation.

OFFICIAL ACTION TAKEN FOLLOWING INVESTIGATION

Upon request of the U. S. Department of Agriculture, we are informed that the Cleveland Health Department under the direction of Dr. H. J. Knapp placed an embargo on all remaining stock of the sardine pack in question in that vicinity on July 11, 1925, and the U. S. District Attorney seized the same on August 15, 1925. Likewise, the U. S. Dept. of Agriculture took steps to segregate the balance of the pack elsewhere.

The Ohio State Department of Health, up to the date of reporting hereof, February 3, 1926, has received no notice of other cases of botulism poisoning from any source during the current year either in the vicinity of Solon, Ohio, or elsewhere in the state. It is thought that danger of further outbreak from this particular pack is now over, following the steps which have been taken. Nevertheless, dealers, purchasers, and food handlers should be constantly on the lookout, as always, for "flippers" and "swells" in canned goods of every description and promptly destroy them.

The U. S. Bureau of Chemistry took a stand against canned goods which are without vacuum, or overfilled, or those known as "flippers" or "springers" and which, therefore, confuse retail dealers and purchasers as to whether or not they are spoiled. Such a stand is obviously rational and necessary for public safety.

Although begun critically late, the investigation illustrates how coöperative action on the part of all concerned resulted in precluding further fatalities, as

* Since writing the above Dr. Charles Thom, U. S. Microbiological Laboratory, has informed me in a personal conference that 2 other fatal cases due to eating sardines of the same pack were brought to his attention in California.

well as in the most economic solution to be expected of what might otherwise have been a widely disseminated and protracted outbreak of a singularly fatal form of food poisoning. Here the vigilance is to be commended of the National Canners' Association in learning of the situation and starting the investigation; of the local health department in assisting the same; of the U. S. Bureau of Chemistry and the Cleveland Health Department in taking effective steps to limit further outbreaks; of the public press in constructively handling the news so as to warn the public against spoiled canned sardines, but in such a way as not to ruin a national industry otherwise not implicated; of the grocery company concerned in promptly facilitating evidence and recalling suspected stock; and the frankness of the afflicted family including the *partes principes* in supplying the details essential to establishing causal relations.

[Acknowledgment is especially due Professor Edwin O. Jordan, of the University of Chicago, who advised upon the proper procedures and whose laboratory was also the first to report positive findings from the scrapings secured; Frank Gorrell, Secretary of the National Canners Association, for his promptness in providing whatever information came to his office; Dr. Daniel J. Kindel, Chief of the Division of Industrial Hygiene, and Fred Berry, Chief of Laboratories, Ohio State Department of Health; Professor W. A. Starin, Ohio State University; Harry D. Garrett and Dr. Charles Thom, U. S. Bureau of Chemistry; and A. S. MacLaren, local sanitary officer under Dr. Robert Lockhart, Cuyahoga County Commissioner of Health, Cleveland, Ohio, for their various coöperations and valuable services in the investigation reported herewith. In addition, the valuable observations made by the family physician, Dr. Edwin F. Wakefield, Chagrin Falls, Ohio, and by Dr. John S. Phillips, Cleveland Clinic, Cleveland, Ohio, who was called as consultant the day prior to the death of the mother, and who furnished the record concerning the specific nerve involvements, were indispensable in arriving at the findings obtained in this investigation.]

THE HEALTH EXAMINATION OF THE PRESCHOOL CHILD*

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THERE is no unanimity of definition of the term, the preschool child. While it is usually used as referring to the child of the age-period between infancy and the time of entering school, this has been construed as beginning with either the end of the first or second year of life and ending with the fifth or sixth year. More recently, the term has been used by students of child development as inclusive of the entire period from birth to the eruption of the sixth year molars. With the tendency to the extension of the school life of the child into the earlier years through kindergarten and the newer nursery school, the meaning of the term is becoming even more complicated and indefinite. From the standpoint of child hygiene activities, we usually mean the period from the time the child passes from the care of the infant welfare center until he comes under the health supervision of the public schools, roughly the 2-to-6-year period. This is distinctly a classification upon an administrative basis.

The growth and development of the child is a continuous process. In the same way that many of the health problems of the child of school age have their origin in the preschool years, so many of the problems of the child from 2 to 6 years date back to infancy and even prenatal life. While from an administrative standpoint it may be necessary to consider periods of development, the fact that these are arbitrary and have no existence in an anatomical or physiological sense must be kept clearly in mind.

* Read before the Child Hygiene Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 21, 1925.

The preschool period has frequently been termed the neglected period of childhood in the sense that less child hygiene work has been done for children of this age group than for infancy and school ages; further, we know less of the normal growth and development at this period, which is an essential for a knowledge of the abnormal. The difficulties of reaching this age-group are well known. The methods of solving the problems it presents must still be considered in an experimental stage.

In discussing the health examination of children of this period it is an obvious necessity to consider what we mean by this term, its purpose and its scope. First, we can agree that it means a physical examination to discover physical defects or diseases which are prejudicial to the health of the child. As a corollary to this we must be ready to provide means or facilities to correct the defects found, if this is possible. Otherwise, the physical examination is a meaningless gesture. Secondly, it must include an examination from time to time for the purpose of checking growth and development in order to be certain that these are taking place in a normal manner. Thirdly, it is my feeling that the health examination should extend beyond the physical side and include the question of mental development in its broadest aspects, for we realize to-day that the mental growth which takes place during these years is of tremendous import. Further, the habit and behavior problems of the preschool child are intimately related to and connected with the physical problems.

The physical examination of the child should stress the important and minimize the unimportant. This is particularly true of health examinations as contrasted with examinations of sick children. We have passed far beyond the point when statistical purposes can be the excuse for much of the unnecessary data collected, recorded, and filed away to be forever forgotten. Statistics of the physical defects of the preschool child are as a whole quite in accord. Here and there appear variations which are due to social and racial differences in the type of material examined as well as to the personal equation of the examiner in recording defects.

Among preschool children malnutrition exists in from 20 to 25 per cent. Postural defects related to the muscular and skeletal systems are common, occurring in from 40 to 50 per cent. Dental defects are the most common, some 60 to 70 per cent having caries to a greater or lesser degree. Nose and throat troubles rank high as well as important, totaling from 40 to 50 per cent. For visual and eye defects quite divergent figures have been recorded. Cardiac, pulmonary, and nervous diseases are relatively low. The importance of these figures is not simply that they indicate that a large part of our preschool population (estimated at some 10,000,000) is physically defective or abnormal, but that these children reach school age handicapped. These physical defects which should have been prevented or corrected are in large part responsible for the fact that some 25 per cent of children fail of promotion at the end of their first school year. The figures serve to point out the most important items to be considered in the physical examination.

We recognize nutrition as a good index of the general health and physical condition of the child. Existing tables of the height-weight ratio are satisfactory for practical purposes and the majority of well nourished children will fall within a group of a 10 per cent variation from the mode. Malnutrition, of course, cannot be based on the height-weight ratio alone, but must take into consideration the question of tissue turgor, subcutaneous fat, anemia, and the integrity and development of the muscular and skeletal systems. Malnutrition is not a disease but its presence is important as an indication of something wrong in the child's physical condition or environment requiring a thorough search for the factors at fault.

Closely associated with the nutritional condition is the question of faulty posture

which usually has its origin in muscular and skeletal defects. It is not infrequently the result of malnutrition early in infancy or in rachitis in later infancy. In this respect many of the postural defects should have been prevented earlier, but a great deal in the way of exercise and training can be done at this period to correct the defects and prevent them from increasing and being carried over into the school age period.

TONSILS AND ADENOIDS

The examination of the nose and throat is most important. Some 40 to 50 per cent of preschool children show diseased tonsils, adenoid hypertrophy, and enlarged cervical lymph nodes. There is usually a confusion in classifying these things together. This is a most unfortunate tendency as it is closely related to the conception of diseased tonsils and adenoids as one and the same thing. Tonsils may be infected and be a cause of chronic toxemia in young children, but this is uncommon. Tonsils are rarely so large as to cause obstruction. Adenoids, either chronically or acutely enlarged, obstruct nasal respiration leading to infection of the adenoid tissue and nasal sinuses, which leads to mouth breathing. Adenoids cause trouble and need removal perhaps in ten cases to one in which tonsillectomy is required at this age-period. The development of chronic rheumatism and cardiac disease is rare before the fifth to sixth year. The indications for tonsillectomy and adenectomy should be distinctly separated as well as the pathological conditions of which they are the cause.

DEFECTIVE TEETH

To what extent defective deciduous teeth are a cause of ill health and are related to malnutrition is hard to say. Certainly in a large part of the 70 per cent referred to the defect is relatively unimportant. Proper oral hygiene is of course essential and the prevention of bad caries by dental means is important.

VISUAL DEFECTS

It is exceedingly difficult to determine visual defects at the early preschool period. This examination can only be made by an experienced ophthalmologist of patience and skill. Careful studies show that about 85 per cent of the children of this age-period have good vision. The remaining defects are obvious in large part, as strabismus. Routine test chart examination which is necessary at the school age examination is of little value. Hearing is also difficult to test in routine examination.

CARDIAC DISEASE

Organic cardiac disease is uncommon and usually congenital. Murmurs heard at this age are chiefly functional. Pulmonary examination as a routine gives little information and most children with pulmonary disease are under the care of a physician as a result of definite illness. Skin diseases, conjunctivitis, hernia and the like must be regarded as accidental findings rather than conditions for which a thorough search is necessary.

COMMUNICABLE DISEASES

It is impossible to discuss the health of the preschool years without at least mentioning the communicable diseases, as this is the period of their greatest incidence and mortality. Diphtheria and smallpox are the only ones against which we have definite methods of prevention, as the final judgment of the value of scarlet fever immunization must be suspended. Vaccination against smallpox should be carried out in infancy. Toxin-antitoxin injections should be given in the latter part of the first year. To wait until the school age to immunize against diphtheria is to leave the child unprotected during the most dangerous and susceptible period of its life. The opinion is gradually being reached that it is wiser not to do a preliminary Schick test on the child of preschool age, but to give the immunizing injection and follow with a Schick test some 6 months later.

DEVELOPMENT

Watching and recording the development of the child through the preschool years is as important as the physical examination for detecting physical defects. The actual and percentage growth during this period is fairly constant from year to year and relatively small compared with the first two years of life. The annual average gain is approximately 4 pounds and the increase in height about 2 to 2½ inches. Racial differences and types of body habitus are a source of normal variation, but we have relatively little data regarding them for children of this period. The gain is quite periodic and irregular as a rule, owing to the frequency of infections during these years. Examination of the growth every 6 months or at even a year is sufficient. Where conditions exist which markedly influence growth and development, they are usually of such a nature that constant medical supervision is required and being obtained. Forms for recording physical development during these years are not entirely satisfactory. They are usually too cluttered up with the unessential. The record of the child's growth should be a continuous one as the question of what the child has been doing during the period since the last examination is of equal importance to the exact status at the time of the examination.

MENTAL DEVELOPMENT

So far we have discussed the purely physical side of growth. During the preschool years we are dealing with an organism which is growing mentally at an amazing rate of speed. We cannot consider the physical side alone but we must look upon the development of the child as a whole, and this links the physical and mental sides closely together. Child specialists have concluded that our health examination of the preschool child must be a developmental examination. We have all come to recognize the importance of habits upon the health of the child. The recognition of "habit causes" of malnutrition, faulty posture, defective teeth, etc., is as important as the searching out of purely physical causes. Hence, the health examination must be developed on a broad basis.

Our knowledge of the mental development and the psychology of the preschool child is incomplete, we must admit. It is only recently that this side of the child's development has been made the subject of intensive experimental study. During the current year two books[1, 2] from American clinics have appeared which mark a distinct advance in the fundamental knowledge of mental development in the preschool years. To outline the mental growth by periods, the development of personality traits, and to discuss the emotional conflicts of the preschool child are impossible within the limits of this paper. That they must be a part of the health examination we are satisfied, but how such examinations are to be carried out and made practical for general application is a problem which must be worked out. Here again experience will eventually help us to separate the essential from the nonessential.

SUMMARY

Briefly, the health examination of the preschool child should consist of two parts: First, the physical examination for the recognition of physical defects, and unless means and methods for correcting the physical defects are available, such examinations are worthless. Secondly, the health examination should be repeated at intervals to ascertain and record development. This should be broadly interpreted to include both physical and mental growth. Such an examination for large groups or adapted to child hygiene methods offers a question for experimentation and solution which raises many interesting and important points.

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THE POSSIBILITIES IN DENTAL HYGIENE*

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THE TERM oral or dental hygiene usually brings to the mind of the health worker, and frequently of the dentist, a condition of cleanliness accomplished by the mechanical cleaning or prophylaxis of the dental hygienist or the tooth brushing done by the patient himself. In either case, it is a purely artificial condition so far as the physiological cleanliness is concerned, and not in any but an indirect way implying or referring to real dental health or healthy tissue.

Attempts have also been made to sterilize the mouth and its contents, the teeth, in order to kill the bacteria supposed to be the cause of dental caries. This plan was the natural outgrowth of the chemic-bacterial (Miller's) theory of caries which has been carried out with tooth powders, pastes, mouth washes and dentifrices of great variety during the last 50 years.

During all this time dentists have been busy caring for the last stages of caries by inserting large fillings, inlays, crowns and bridges, and supplying the lost organs in all varieties of numbers. Dentists and consequently the public also believed that wonderful things were being accomplished in dental hygiene.

Only within the last few years have we seriously considered that all of this effort was only working on the surface of things, that teeth might decay or remain healthy because of some systemic condition which was entirely apart from the mere cleanliness or temporary "near" asepsis of the teeth. While acid secretions and bacteria in the mouth play a part in the process of caries, they cannot exist and have this serious effect if the saliva is the normal secretion of a physiologically balanced system. Under this condition the structure of the teeth will be ample to withstand the normal bacteria and the normal saliva. When the right systemic condition is maintained by supplying food of an adequate and complete kind, and metabolism is being accomplished in a normal manner, this condition will exist.

So with this explanation consideration is invited to a condition which we will call "dental hygiene," which means real dental health or healthy and normal teeth. This also refers to teeth which are not patched up as a last resort, or are in such a condition as to have lost their vitality, but rather teeth with a minimum of dentistry done on them.

DENTISTRY AND HEALTH

With these definitions in mind it is possible that orthodox or technical dentistry is, at the present time, about as near to accomplishing prevention (or dental hygiene) as it ever will be. We do not in any way belittle the advance which has been made in dentistry during the last 25 years, and realize that the technical developments are very remarkable, but considered from a standpoint of producing healthy teeth, dentistry has been a failure. We have been giving a great deal of attention to the cosmetic and mechanical features of dentistry, but we have almost entirely overlooked that all important phase, health. Literally, we have almost saved the teeth at the ex-

* Read before the Child Hygiene Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 20, 1925.

pense of the patient's health. Ever since dentistry was established it has been treating teeth as though they were a foreign body in the mouth rather than as one of the organs of the body, developed and maintained in the same way that other organs are developed and maintained.

Dentistry has been working upon the wrong end of this problem. Merely reparative or curative work has been undertaken after the diseased condition has been established, rather than making any attempt to forestall this disease which we recognize as caries.

Those who are working on the tuberculosis problem know better than to attack their problem in this way. They are giving relatively little attention to the established condition, but very great attention and effort are placed upon those in whom the condition is just appearing. Prevention of anything is never so spectacular as the cure, but prevention is many times more satisfactory.

PREVENTIVE DENTISTRY A MEDICAL PROBLEM

At the present time we do not know of what preventive dentistry actually consists, or how it may be definitely and positively accomplished. We know that it is a medical problem more than a dental one, and that the operative procedures of dentistry are not in any way concerned with the accomplishment of real prevention. It is a problem of nutrition, or rather of metabolism dealing with foods, vitamins and minerals and their separate disposition in the body.

Prenatal care and supervision are necessary in order that the child's first teeth may be properly developed, and the prospective mother needs suitable food and dental and nutritional attention in order to obtain this. During infancy breast feeding, and later, good, properly selected foods are essential to the development of the primary teeth and the beginning development of the secondary set.

We are more or less familiar with all of these things which contribute to dental hygiene for the prospective mother, the baby, the young child, and during childhood; but this is not actual prevention. The nearest we can come to it, from a dental standpoint is the early treatment by a dentist for a child who has been carefully followed from birth by a pediatrist.

Dentistry can contribute very little, if anything, during the first 2 years of infancy. During this time and later, we must depend mainly upon a pediatrist interested in the development of the teeth. But after the primary teeth are erupted, dentistry may then step in and repair such developmental or organic defects as may exist. This work should begin between the ages of 2 and 3 years, and at the age of 6 years the same early attention is needed for the so-called sixth year molar, because in a very large percentage of cases it is defective in its development. Unless this attention to both the primary and the secondary set of teeth is given almost immediately after the eruption of these teeth, it is too late to obtain the full advantages of early care and treatment, and to prevent such later troubles as are sure to follow.

RESULTS OF CARE

In a recent check-up of the school children in the Boston public schools, more than 90 per cent of 1,000 children in the ninth grade had 4 good sixth-year molars with vital pulps and nothing but small fillings in organic defects (pits and fissures). If results of this kind can be obtained in a large group of children starting indiscriminately in the first, second and third grades, we may expect a very much better showing in any group in which all could be started definitely before their 7th year of age. Teeth treated in this way, unless some serious nutritional condition appears, will last these children during their whole lifetime. It may be necessary to replace some of the fillings, depending upon the thoroughness with which they were originally done, but otherwise the teeth will be serviceable.

Teeth in this condition never reach the stage where there are serious complications arising from them, such as the necessity for large fillings and pulp cappings, inlays, devitalization of the pulp of the tooth and the consequent root canal treatment, with a possible abscess and the focal infection which so frequently results therefrom.

We should realize that practically all of the conditions and the diseases said to have their origin in the teeth occur in these teeth or from these teeth after the teeth themselves have passed a certain point of soundness. So all the systemic conditions—endocarditis, arthritis, rheumatism and others, so far as the teeth are concerned—can be entirely prevented by this early attention or dental hygiene.

Treatment at the right age is really the key to success and results in the avoidance of subsequent complications. It is upon this one simple feature that practically all satisfactory results in dental hygiene have been obtained at the Forsyth Dental Infirmary.

EXTRACTIONS DECREASED

Ours is an extremely simple plan and does not include any elaborate or complicated technic or orthodox dentistry sufficient to be of real interest to the dentist. For this reason it has been extremely slow to accomplish this early care, but has been so very satisfactory in its results. Among other advantages it has resulted in the reduction of the extraction of sixth-year molars which had previously been carried out very extensively and radically. During a period of 10 years, extraction by this means has been reduced from 1 in every 3 teeth, to only 1 in every 200; the 1 in every 200 being from the mouth of a child from some outlying town or district where early attention had not been definitely given.

Ten years ago when children were coming to the clinic at an older age, averaging from 12 to 16 years, a very large proportion had their sixth-year molars in such a hopelessly destroyed condition that there was nothing which could be done for them except to extract.

CLEANING TEETH OR EARLY FILLINGS

This plan of early attention has almost entirely superseded and overshadowed the purely technical matter of cleaning teeth as a means of controlling dental caries in the teeth of school children. Cleaning and brushing alone has practically no value and no effect on teeth in which these organic defects are permitted to remain uncorrected. There is nothing which will control this condition, except to cut out this diseased and defective tissue and replace it with a filling. Therefore, between the two conditions, cleaning teeth or early fillings there can, in our estimation, be no doubt whatsoever as to the proper valuation for the purpose of dental hygiene—the one being practically useless, while the other will, if adequately carried out, give the most satisfactory results of any local care.

If the plan of early treatment as suggested, could be adopted in all public school clinics and in private practice for children, within a few years most of the procedures now considered good practice in dentistry, such as the insertion of large fillings and inlays, the construction and application of crowns, bridges and dentures, would be practically obsolete.

NUTRITIONAL FACTOR IN ORGANIC DEFECTS

While this early treatment produces such remarkable results, it is not really dental hygiene, for there is something back of these organic defects—the systemic condition causing the defect. This of course is a nutritional factor and is distinctly a medical one. When more is understood about calcium metabolism and fixation, so that some procedure can be carried out to insure the development of teeth free from organic defects and with perfectly formed enamel and dentine, and the manner of maintaining this good structure is known, we shall then have the actual condition, now artificially attempted, of real dental hygiene.

RENOVATION IN SWIMMING POOL CONTROL

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THE IMPORTANCE of swimming pool sanitation is sometimes minimized. However, the work of Atkins,[1] and Burrage,[2] and citations from articles by Manheimer,[3] together with the answers of 500 physicians interrogated in a questionnaire sent out by the Committee on Bathing Places of the American Public Health Association, indicate that there is a problem in this field.

In order to maintain a safe pool of water the water in the pool must be disinfected and this disinfection must be continuous. Filtration and primary sterilization are entirely satisfactory for drinking water protected from infection by storage, but these are not sufficient for swimming pool waters where such protection is impossible.

Evolution of swimming pool sanitation has been going on very rapidly since the introduction of chemical sterilization and it is now possible, by very simple means, to sterilize swimming pool waters. The important problems are:

First: To use a chemical disinfectant which will not only produce primary sterilization, but which can be added in such quantity that a residue is left which acts as a continuous disinfectant and maintains a water in the pool of as good quality as drinking water.

Second: To find some simple, easily applied determination which can be used as a control test to replace the more lengthy bacteriological tests now used.

Manheimer[4] and Perkins[5] were able to produce a water by the use of filtration and ozonation which met the Treasury Department *Standards For Safe Drinking Water*. But the results given do not indicate that such purity was maintained continuously in the pool.

STERILIZATION BY ULTRA-VIOLET RAYS

A review[6] of the use of ultra-violet rays in the sterilization of water is given by Warren. While Walker and Pryer[7] claim some residual bactericidal effect from these rays, using Petri dishes and crucibles, they say: "Considerable experimentation with this equipment—(standard ultra-violet ray equipment for swimming pools)—under normal working conditions of flow, failed to show that any bactericidal property was imparted to the water." In a later publication, Walker[8] gives as his fourth conclusion: "Sterilization by ultra-violet rays of swimming pool water in a recirculation system properly designed and operated gives a water in the pool which compares favorably with the government standard for drinking water."

Ultra-violet rays and ozone undoubtedly sterilize water, but from available published data the residual bactericidal effect is an uncertain quantity. From what is known concerning the activity of the rays absorbed, it seems that if it were possible to supercharge a water to such an extent as to render it bactericidal, then its use for bathing, especially near the charging tubes, possibly might be somewhat harmful to the eyes.

USE OF LIQUID CHLORINE

The results of Whittaker[9] and many others prove that one of the most satisfactory methods of maintaining a safe

WOMEN'S SWIMMING POOL, WOMEN'S GYMNASIUM, UNIVERSITY OF WISCONSIN
Water in use for five months with renovating system operating

pool of water is by the use of liquid chlorine. There have been many conjectures as to how much residuum of chlorine can be safely kept in the pool in order to maintain a safe pool of water. By residuum we mean the amount of chlorine available at all times to render innocuous any added pollution. Stovall and Nichols[10] published a result which indicated that 0.2 part per million of chlorine might be irritating to the eyes. This report was based on evidence gathered from the bathers. But the experience obtained by Nichols, who over a considerable period of time entered the pool daily, with chlorine concentrations varying from 0.0 to 0.25 p.p.m., proved no irritation was caused.

Perkins[5] states that no one complained of smelling chlorine or of experiencing eye irritation from water found to contain 0.5 p.p.m. of chlorine. The fact that these amounts of chlorine are not irritating to the mucous membrane of the eyes is explained on the basis of the probable formation of an alkaline hypochlorite with the alkalinity of the water such as is formed in Dakin's solution. It is a common practice to employ this solution, which has a concentration of chlorine as hypochlorite approximating 4,000 parts per million, in the irrigation of open wounds. In this connection it must be remembered, however, that it is the alkalinity in the water which is important. In the case of our pool water, which has an alkalinity of 140 p.p.m., the chlorine is converted very largely into hypochlorite, or to chloramine type compounds to some extent when organic matter is present in the water.

This paper reports work done on the women's swimming pool of the University of Wisconsin, covering a period of 4 months from February 13, 1925, to June 5, 1925.

DESCRIPTION OF POOL AND EQUIPMENT

The above illustration shows the pool, which is located in a spacious room with

high ceilings and an abundance of light from north, south and west.

The pool is rectangular in shape and has a capacity of approximately 50,000 gallons when filled to the scum trough. It is lined with white tile throughout and is surrounded by a walkway of red tile and in the edge of this next to the pool is a slight depression which carries away the surface water, preventing contamination of the pool water from this source. Overlooking the pool is an observation balcony, only a section of which shows in the picture.

The pool is equipped with pressure filters, centrifugal pump for recirculation of the water, automatic heat control by means of a pool thermostat and steam additions, and a chlorinator of the pulsating type.

RENOVATION

Renovation is accomplished by means of refiltration and chlorination. A vacuum cleaner is used weekly to remove the sediment from the pool.

By this renovation system we are able to reduce the cost of operation $540 per year over the cost of the former method of a complete renewal of the water weekly.

It will be seen from the following analyses that the Mendota Lake water used in this pool is very desirable from both a physical and a chemical standpoint, being clear, low in organic matter and having a satisfactory alkalinity.

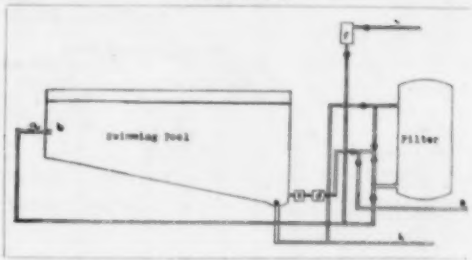
MINERAL ANALYSIS

	p.p.m.
Silica	15.2
Aluminum and Iron Oxides	2.2
Calcium	19.8
Magnesium	21.6
Sodium	3.6
Potassium	2.2
Carbonate radicle	77.2
Sulphate radicle	15.3
Chlorine as chlorides	3.0

SANITARY ANALYSIS

	p.p.m.
Turbidity	none
Odor	none
Color	none
Nitrogen as free ammonia	0.022
Nitrogen as albuminoid ammonia	0.192
Nitrogen as nitrites	0.0
Nitrogen as nitrates	0.7
Hardness by soap method	172.0
Alkalinity to methyl orange	149.0
Oxygen consumed	2.7
Total solids	214.0

FIGURE I



POOL AT UNIVERSITY OF WISCONSIN

Diagram of pool and renovation system (not drawn to scale) (o) operating valves; (a) inlet pipe; (b) distribution pipe across pool (not shown); (c) centrifugal circulating pump; (d) steam water heater; (e) sewer drain (for cleaning pool); (f) chlorinating apparatus; (g) lake water main; (h) to sanitary sewer; (i) water for dissolving chlorine gas; (j) water height in pool.

BATHERS

Bathers are required to take a soap and water shower bath before entering the pool and in addition a foot douche immediately before entering. They wear gray woolen suits. There is a weekly average of 1,000 persons using the pool, each for one-half hour periods.

EXPERIMENTAL WORK

To secure information on the problems involved in the sanitary control of such a pool, experiments were designed to answer these questions:

How much chlorine residuum is necessary to maintain an unquestionably safe pool of water continuously?

Is there a correlation between the bacterial results and residual chlorine content?

Can sanitary control of the pool be effected by the ortho-tolidine test alone?

Is the distribution of the chlorine in the pool water uniform throughout the pool?

What chemical changes take place in the pool water after continuous use over long periods of time?

How long may the water of a pool be safely used without renewal?

Samples for analysis were taken from two sources, one from the central part of the pool at the shallow end approximately 6 inches beneath the surface of the water, and the other from the deep end at a similar point. As the chlorinated water enters the shallow end through a distrib-

TABLE I

ANALYTICAL RESULTS FOR FOUR MONTHS' PERIOD

	Bacteriological Data: Results of *B. Coli* Tests in X c.c. water					Counts on Lactose Agar 1 c.c.		Chemical Results (p.p.m.): Free Chlorine Found							
1925	0.1 c.c.	1.0 c.c.	10 c.c.	10 c.c.	10 c.c.	37° C.	22° C.	Deep End	Shallow	Oxy. Con.	Tot. Solids	Free NH_3 N.	Alb. NH_3 N.	NO_2 N.	NO_3 N.
2–13	0	0	0	0	0	0	0	0.1	0.5	2.7	214	.022	.192	0	0.7
2–20	0	0	0	0	0	4	0	0.12	0.16	2.6	224	.068	.198	0	0.6
2–27	0	0	0	0	0	1	0	0.15	0.17	2.5	206	.050	.228	0	0.9
3–6	0	0	0	0	0	3	1	0.31	0.33	1.9	204	.036	.155	.001	0.7
3–13	0	0	0	0	0	137	7	0.17	0.18	3.2	210	.055	.133	0	0.8
3–20	0	0	0	0	0	17	1	0.19	0.20	2.5	222	.095	.232	.001	0.8
3–27	0	0	0	0	0	18	3	0.14	0.14	3.3	202	.048	.112	0	0.8
4–4	0	0	0	0	0	5	5	0.08	0.12	2.9	220	.057	.196	0	1.2
4–10	0	0	0	0	+	9,370	11,500	0.02	0	1.3	204	.086	.170	.001	1.4
4–17	0	0	0	0	0	1	6	0.40	0.40	2.9	214	.011	.150	0	1.0
4–24	0	0	0	0	0	1,540	10,500	0.06	0.06	1.9	194	.109	.145	0	0.4
5–1	0	0	0	0	0	2	0	0.16	0.16	2.5	192	.070	.165	0	0.8
5–8	0	0	0	0	0	1	30	0.21	0.11	3.0	214	.054	.155	0	1.0
5–15	0	0	0	0	0	1	0	0.18	0.22	2.2	216	.070	.173	0	1.2
5–22	0	0	0	0	0	1	6	0.16	0.21	1.5	224	.062	.132	0	1.2
6–5	0	0	0	0	0	1	1	0.26	0.32	2.6	266	.160	.200	0	0.6

uting pipe extending across the end of the pool and two feet beneath the surface of the water, it was thought that the samples collected at this end represent one extreme of the chlorine content of the entire body of water and samples from the deep end the other extreme.

Bacterial counts, *B. Coli* tests and complete sanitary chemical analyses were made of the deep end samples and free chlorine test of samples from both ends weekly during the 16 weeks covered by the report in this paper. The *Standard Methods of Water Analysis* of the American Public Health Association was used in making the analyses and tests.

During the entire period the pool was operated as a recirculating purification system and no new water was added except to make up losses due to evaporation, splashing over scum rail and in vacuum cleaning. (Table I gives results of these tests.)

DATA OF OPERATION

Operating capacity of pool	50,000 gal.
Rate of chlorination by pulsations	5 1/3 per min.
Amount of chlorine. Rate per 24 hours	2 lb.
Actual time chlorinator in use per day	9 hrs.
Actual amount of chlorine applied daily	0.75 lb.
Pump rate per minute	85 gal.
Total pumpage for 9 hours	45,000 gal.
Chlorine added	2.1 p.p.m.
Intended residuum at all times in pool	0.15 to 0.2 p.p.m.
Actual residuum	(See results & tables)
Number bathers weekly	1,000
Cost chlorine gas	$0.09 per lb.
Cost chlorine gas+freight, etc.	$0.15 per lb.
Weekly consumption of chlorine gas	4.5 lbs.
Cost chlorine per week	$0.68

DISCUSSION

The results show that the bacterial counts were well within the Treasury Department *Standards For Safe Drinking Water* at all times when the residuum of chlorine was kept between 0.15 and 0.2 p.p.m. Likewise *B. Coli* was absent at all times except on April 10 when the residuum of chlorine dropped to 0.02 p.p.m. This drop occurred during the spring vacation (April 4 to 10), at which time no chlorine was added to the pool. The high counts of April 24 are explained by the fact that the chlorinator was set at 1 1/3 pulsations per minute instead of 5 1/3 as directed.

It is not possible to state what amount of chlorine is necessary to maintain a residuum of from 0.15 to 0.2 p.p.m. in all pool waters. Our bathing load was only 20 per cent of the maximum allowed by the Committee on Bathing Places of the A.P.H.A. With waters of different chemical character and with a pool accommodating different bathing loads it is obvious that the amount of chlorine added must vary, but the residuum necessary probably will not vary from that given above. In the case of this pool and the men's pool at this institution we have found it possible to depend upon the ortho-tolidine test as an indicator of the sanitary quality of the water.

Our chemical analyses show very little change in the sanitary quality of the water during the entire period of the test.

Free ammonia nitrogen showed a small increase but it was not constant enough to indicate progressive pollution. The oxygen consumed, while somewhat erratic in amount, gives no hint of the least deterioration in the quality of the water. The alkalinity, hardness, iron and manganese although determined regularly showed no radical change. No color nor turbidity was present at any time and the black marking lines on the white tile bottom could be clearly seen throughout the period of the test. There was a slight chlorine-like odor discernible in the bottles of water, when they were opened for analysis, but this odor was not noticeable in the pool room. Chlorides were determined regularly, but aside from an increase from 3.0 p.p.m. in the unchlorinated water to 18 p.p.m. in the chlorinated lake water during the first week, no further change was noticed. We have no explanation to offer for this unexpected result, unless it is that the chlorine unites with proteins to form compounds allied to the chloramines, thus removing it from action with silver nitrate in test titration.

Free chlorine in the pool water remained quite constantly near the 0.2 p.p.m. mark, except on April 17, when the bathing load was very low, and once in the shallow end, when the centrifugal pump stopped working. On these dates the chlorine content increased; in the former instance to 0.4 p.p.m. and in the latter to 0.5 p.p.m. in the shallow end of the pool.

DISTRIBUTION OF CHLORINE

It is regrettable that the distribution of free chlorine in a still body of water has not been studied more closely. From the results here recorded, it appears that with the entry of heavily chlorinated water in one part of the pool only, the distribution is not always uniform. We attempted to obtain this distribution but realized that only an approximation was obtained. In one test we sampled 69 points and in another 199 points, taking our samples just beneath the surface for the surface samples and within one foot of the bottom for the bottom samples. According to the charts these tests show a considerable variation in the concentration.

Chart I represents the distribution of free chlorine in the pool when it had not been in use for 24 hours. The chlorination and refiltration apparatus was run from 8 A.M. to 5 P.M. the day the tests were made, and the sampling and testing were done between 3 P.M. and 5 P.M. The chlorine varied between 0.04 p.p.m. for the low concentration to 0.28 p.p.m. for the high.

Charts II and III show the distribution after the pool had been standing quiescent for 44 hours without the introduction of chlorine, except that chlorination and re-

CHART I

Shallow End of Pool

	0.22	0.24	0.28	0.22	0.18	Chlorinated Water Enters Here
	0.12	0.20	0.18	0.18	0.05	
	0.18	0.14	0.10	0.10	0.10	0.18
0.20	0.10	0.10	0.05	0.10	0.10	0.22
0.20	0.12	0.12	0.08	0.08	0.09	0.24
0.22	0.12	0.12	0.08	0.05	0.06	0.26
0.22	0.12	0.12	0.12	0.09	0.06	0.24
0.18	0.12	0.07	0.07	0.09	0.05	0.20
0.07	0.06	0.10	0.10	0.11	0.09	0.12
0.09	0.10	0.09	0.10	0.06	0.08	0.06
		0.07	0.07	0.04		Outlet to Filters

Deep end of the pool.

FREE CHLORINE IN POOL AFTER 24 HOURS QUIESCENCE

Outside squares give results of free chlorine at bottom of the pool. Inside squares—surface. Pool quiescent for 24 hours previous to tests but renovation system in operation continuously for 7 hours previous to test.

CHART II

Shallow end of pool

0.13	0.21	0.13	0.13	0.13	0.13	0.06
0.15	0.16	0.16	0.14	0.16	0.14	0.12
0.21	0.14				0.14	0.15
0.15	0.14				0.14	0.13
0.15	0.15				0.14	0.13
0.16	0.15				0.14	0.13
0.13	0.20				0.14	0.11
0.14	0.19				0.12	0.10
0.14	0.13				0.13	0.11
0.14	0.14				0.13	0.10
0.12	0.16				0.13	0.10
0.12	0.18				0.13	0.11
0.12	0.18				0.14	0.12
0.13	0.17				0.14	0.11
0.13	0.15				0.13	0.10
0.14	0.15	0.13	0.12	0.12	0.14	0.11
0.15	0.13	0.13	0.12	0.13	0.13	0.10

Deep end of pool

CHLORINE IN BOTTOM SAMPLES AFTER 44 HOURS QUIESCENCE IN P.P.M.

Bottom samples in free chlorine tests. Central bottom samples not taken. No chlorine for 44 hours before samples were taken except that the renovation system was started 1 hour before sampling was begun.

CHART III

Shallow end of pool

0.20	0.19	0.13	0.13	0.16	0.15	0.10
0.22	0.20	0.14	0.14	0.17	0.16	0.15
0.21	0.19	0.13	0.14	0.14	0.14	0.14
0.21	0.19	0.14	0.14	0.14	0.20	0.15
0.21	0.18	0.14	0.14	0.13	0.20	0.18
0.15	0.16	0.13	0.14	0.12	0.18	0.12
0.15	0.16	0.14	0.14	0.12	0.12	0.11
0.17	0.16	0.13	0.14	0.13	0.11	0.10
0.15	0.16	0.15	0.14	0.12	0.10	0.11
0.15	0.15	0.15	0.14	0.12	0.11	0.09
0.15	0.16	0.14	0.14	0.13	0.12	0.10
0.16	0.17	0.14	0.14	0.14	0.14	0.11
0.18	0.17	0.14	0.14	0.14	0.14	0.11
0.18	0.18	0.13	0.14	0.14	0.15	0.11
0.17	0.17	0.15	0.14	0.15	0.15	0.13
0.18	0.16	0.15	0.14	0.14	0.14	0.15
0.17	0.16	0.14	0.13	0.15	0.15	0.14

Deep end of pool

CHLORINE IN SURFACE SAMPLES AFTER 44 HOURS QUIESCENCE IN P.P.M.

Same conditions as for chart II, showing chlorine distribution in surface water of pool.

filtration were started 1 hour before the sampling was begun. Distribution was much better in these tests than at the time the results shown in Chart I were obtained. That was to be expected because of the 44 hour period of quiescence, which allowed the effect of convection currents to be demonstrated.

CONCLUSIONS

1. From an economic standpoint, renovation by filtration, chlorination, and recirculation is a distinct advance in swimming pool operation.

2. For the pool of water in the women's gymnasium at the University of Wisconsin a residuum of from 0.15 to 0.2 p.p.m. of chlorine is sufficient to maintain a pool of water continuously which meets Treasury Department *Standards for Safe Drinking Water*.

3. While the distribution of chlorine in the pool water is not entirely uniform it is satisfactory for practical purposes.

4. There is so satisfactory a correlation between the chlorine content as determined by the ortho-tolidine test and the bacterial purity of the water that we believe that adequate sanitary control of a pool may be effected by dependence upon the ortho-tolidine test for the required residuum of chlorine. The lack of uniformity of chlorine distribution is not marked enough to interfere with the ortho-tolidine test as a control test. The test should be made daily on water samples taken from both the deep and shallow ends of the pool.

5. No outstanding chemical changes take place in the water used continuously when the renovation system of refiltration and chlorination is employed. This would seem to indicate that once the amount of chlorine necessary to secure the required residuum (.2 p.p.m.) was determined, no change thereafter would be necessary unless there was a marked change in the bathing load.

We have not extended our work to the point where we are able to say how long a pool may be used without renewing with fresh water but our results show that at the end of 4 months' time the water is as satisfactory as at the beginning of the run.

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FEDERAL CONTROL OF HAZARDOUS SUBSTANCES*

JAMES A. TOBEY, LL.B., FELLOW A.P.H.A.
Washington, D. C.

THE FEDERAL GOVERNMENT is now exercising certain powers of control over substances which are hazardous to human health. Such regulation of dangerous, or potentially dangerous, commodities and materials is conducted under the constitutional authority of the federal government: (1) to control foreign and interstate commerce; (2) to levy and impose taxes and imposts; (3) to regulate the postal service; and (4) to regulate the affairs of the District of Columbia and the territories. Substances which are now controlled or regulated by federal statutes include foods and drugs, meat, biological products, insecticides, and explosives, under the commerce clause; oleomargarine, white phosphorus matches, and narcotics, under the taxing clause; poisons and other dangerous substances, under the postal laws; the sale of poisons in the District of Columbia, in consular districts in China and other federal areas under the power over such places.

Although many dangerous substances are thus regulated, there are many others over which the federal government exercises no supervision. These include various chemicals, compounds, corrosives, caustics, and poisons. Examples of things which are dangerous and not now controlled adequately by the national government are lye and other alkalies; commercial acids, such as hydrochloric, sulfuric, nitric, etc.; concentrated silver nitrate; zinc stearate; paints and varnishes, containing dangerous organic or inorganic compounds; rat poisons and fireworks using white phosphorus; gasoline, treated with poisonous chemicals; disinfectants, the components of which are hazardous; and various other substances of an analogous nature. Probably there are hundreds of them which will readily occur to experts in industrial hygiene. In fact, it is conceded by all persons familiar with the subject that there are many dangerous materials not now adequately controlled by any law, federal or state, and that existing federal statutes cannot be stretched to cover them.

The object of this paper is, therefore, to point out and discuss certain possible legal and administrative measures for meeting this problem, especially from the standpoint of federal control. The medical and scientific phases will be left for others more competent to discuss them, but it is assumed at the start that the problem exists and that probably the most effective system of supervision would be under federal auspices. Some of the substances mentioned are regulated by state laws, but these laws are seldom uniform, and they do not exist in all states. Lye, for instance, is regulated by statute in less than a dozen states, though a committee of the American Medical Association has been endeavoring for several years to obtain the passage of uniform legislation on this subject. Federal regulation of all these hazards would provide uniformity, central supervision and efficacy of administration, and would insure control throughout the whole country. It would

* Read before the Joint Session of Industrial Hygiene and Public Health Administration Sections of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 22, 1925.

not and need not, furthermore, interfere with the autonomy of the states to deal with the problem entirely within their own jurisdictions.

POSSIBLE METHODS OF FEDERAL CONTROL

The first essential of federal control of these dangerous substances is that it should be reasonable. Many of them are of distinct commercial importance and it is possible that in some cases it might be difficult or even impossible to develop safer or better substitutes. The health and welfare of the people must be safeguarded, however, and broad-minded officials of industrial concerns will usually coöperate in changing deleterious conditions brought to their attention. Manufacturers should also have a selfish interest in desiring to eliminate possibilities of injury from their products, for otherwise they may make themselves liable to civil damage suits. If, for instance, a can of lye is not labeled as poisonous or dangerous, and by the construction of the can, allows lye to fly out, when it is opened, and thereby destroys the eyesight of an individual, the manufacturer would probably be legally liable for the injury caused. While not an insurer against accident, he must, nevertheless, take such precautions as are reasonable and prudent to prevent injury.

In attempting to regulate poisonous substances, the federal government might invoke its power over interstate commerce. Certain poisons could, if considered necessary, be absolutely prohibited from shipment in interstate commerce, or they might be allowed to be so shipped only in accordance with certain conditions. These provisions might be set forth in a congressional enactment, or the law might authorize the drafting of controlling regulations by a properly designated administrative authority. The Pure Food and Drugs Act of 1906 (34 Stat. L., 768), and as subsequently amended, provides for punishment for misbranding or adulterating foods and drugs; defines all of these terms; places upon the Bureau of Chemistry of the U. S. Department of Agriculture the duty of making the analyses necessary for enforcing the act, and empowers the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce to make rules and regulations for carrying it out. The courts have frequently been called upon to pass on this act, and the law has been upheld by the United States Supreme Court as a valid exercise of federal authority.

The federal law of 1902 regulating biological products (32 Stat. L., 729), which provides for the licensing of establishments manufacturing viruses, serums, etc., and the proper labeling of them, similarly authorizes a board comprising the Surgeons General of the Army, Navy, and Public Health Service, to promulgate necessary regulations, and the Treasury Department to carry them out. The Interstate Commerce Commission is authorized to make regulations for the transportation of explosives and dangerous substances in interstate commerce, though the Secretary of Commerce controls such matters on steamboats. When regulations are made by administrative officials, under sanction of law, such rules have the force of law.

Besides regulating the interstate commerce of dangerous substances, the federal government could place a tax on them. This has already been done in the case of white phosphorus matches, with the result that this industry has ceased to exist. The power to tax is the power to destroy, though there are limits to it, as was shown in the case of the attempt by Congress to impose a tax on child labor. This law (40 Stat. L., 1138) was declared unconstitutional on the ground that it was a usurpation by the federal government of rights belonging to the states, for the patent object of the tax was to eliminate child labor within the states.* The tax on white phosphorus matches has never been contested in the courts, but

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since these matches are inherently dangerous in their use, as well as being dangerous in their manufacture, a different result might be reached in a court action. The white phosphorus match tax, incidentally, places no restrictions on the use of this poison in other commodities, and perhaps should be amended for this purpose. Taxes placed by Congress on oleomargarine (Act of August 2, 1886; 24 Stat. L., 209) and on the use of narcotic drugs (Act of December 17, 1924; 38 Stat. L., 785), are as much for regulatory purposes as for the raising of revenue, and these taxes have been upheld by the United States Supreme Court.

The postal laws prohibit the transmission of poisons and other dangerous articles through the mails, except under certain conditions prescribed by the Postmaster-General (Act of March 4, 1909; 35 Stat. L., 1131). This law does not, of course, extend to any other methods of transportation, nor does it in any way remedy adequately the dangers with which we are here concerned.

ADMINISTRATIVE PROBLEMS

If Congress should see fit to consider the passage of a law or laws regulating shipment of hazardous substances in interstate commerce, the question arises as to what bureau should be charged with the enforcement of such a law. As has been pointed out, the Bureau of Chemistry administers the Pure Food and Drugs Act, and also the Insecticide Act of 1910 (36 Stat. L., 332), the Public Health Service enforces the Virus-Serum law, and the Interstate Commerce Commission regulates other dangerous articles. There are in the federal government a number of different bureaus interested in industrial hygiene, notably the Bureau of Labor Statistics of the Department of Labor, and the Public Health Service of the Treasury Department. A plan is now being developed for the better coördination of all federal health activities. Any new centralized department established should be charged with the enforcement of a law concerning hazardous substances, if one should be passed. A taxing law would, however, undoubtedly be enforced by the Bureau of Internal Revenue of the Treasury Department.

LEGISLATIVE PROBLEMS

A law to control hazardous substances would need not only a suitable bureau to enforce it, but would obviously require a considerable appropriation for that purpose. Just how much would be needed is a question. For the control of biologic products, about $40,000 is appropriated annually, but over $700,000 is needed to enforce the Pure Food and Drugs Act. In view of the prevailing wave of economy in federal administration, it is probable that urgent reasons would have to be given to justify a law requiring a considerable expenditure of funds for its enforcement. It is also likely that some time might elapse before Congress would consent to pass such legislation. The history of all important social welfare legislation shows that only after a period of agitation extending over several years are such proposals likely to get favorable consideration.

An excellent bill to safeguard the distribution and sale of certain dangerous caustic or corrosive acids, alkalies, and other substances, has been sponsored by the American Medical Association and has been before several sessions of Congress, but so far without result. It is, moreover, necessary for proponents of a measure to have ample and persuasive arguments, based on facts and scientific studies, in order to induce Congress to consider such propositions. This would, of course, be essential in the problem in which we are interested.

RECOMMENDATIONS

In order that this whole matter may be carefully considered and that such action as seems desirable and expedient should be taken upon it, it is recommended that: (1) a committee be appointed at once by the Industrial Hygiene Section of the

American Public Health Association; (2) the duties of this committee be to coöperate with other agencies, official and voluntary, such as the American Medical Association, and the federal bureaus, in assembling facts regarding hazards from various substances not now controlled; (3) the committee list such as ought to be controlled, and the manner of procedure; (4) the committee prepare, with the assistance of competent legal authorities, and persons cognizant of federal administration, a practical bill covering the situation; (5) the bill be introduced before Congress, and followed through its course, which involves appearance at hearings, and such promotion and propaganda as is desirable and necessary.

It is quite possible to accomplish the results desired and by thus bringing about an effective, reasonable control of all hazardous substances, to add to the health and vitality of the people of this country.

DISCUSSION BY ETHELBERT STEWART

It does not seem to me profitable to discuss Mr. Tobey's paper without going somewhat outside of the lines he has laid down for himself in that paper. He has correctly stated the modes of control of certain commodities and within these lines he has, it seems to me, left nothing additional to be said and nothing to discuss. However, he has not indicated the grounds for such regulation and control as he has described. He assumes, without setting forth any basis for the assumption other than that Congress, as it has actually done in some instances, can legislate with regard to any or all of the substances named by him. Whether he is right in this assumption or not, it would at least add something to the persuasiveness of his statement to indicate the basis on which Congress could proceed, and the reason for such action other than the uniformity and efficiency which he names as being thus obtainable.

Mr. Tobey's paper appears to me to concern itself with modes of administration and campaigns for influencing action. Since within this field he has left nothing to be said, I call your attention to the basic question of the power of Congress to act, and the basic reasons for such action and the objective to be gained.

Three distinct bases seem to exist for the federal control of injurious substances:

(1) The effect on the employe engaged in manufacture, as in the case of white phosphorus matches (sections 6271–6287, Comp. Stats., 37 Stat. 81), though there was some reference in debate to the danger to children from eating the match heads.

(2) The effect on the consumer, as in the prohibition of smoking opium (section 8800, C. S., 38 Stat. 275), or the taxation of its manufacture (sections 6287a–6287c, C. S., 38 Stat. 277).

(3) The element of deception and fraud, as in the Pure Food and Drugs Act (sections 8717–8731, C. S., 34 Stat. 768), which penalizes adulteration, false labeling or misbranding.

So far as present legislation has gone, the United States Bureau of Labor Statistics was directly interested only in the case of white phosphorus matches. A peculiar situation had arisen. The Bureau of Labor Statistics had made the report upon phosphorus necrosis, popularly called "phossy jaw," as it had manifested itself in the match manufacturing industry. The report of the bureau furnished evidence adequate in volume and shocking in character. The evidence of the report stunned the manufacturers of white phosphorus matches in the United States. They had no conception of the condition in their factories. It is substantially true to say that the dentists for the most part in the towns where these match factories existed had taken out whole sections of a jaw while pulling a tooth without knowing that there was such a disease as phosphorus necrosis. The employes had a hunch that phossy jaw was connected with working in the match factory, but this was classed as one of the superstitions of the ignorant working people.

LEGISLATION AGAINST WHITE PHOSPHORUS MATCHES

The publication of the report called the manufacturers together and they practically agreed that since there was a substitute in red phosphorus which made an equally good match at only a trifle additional expense, they would, on the basis of the facts submitted by the

bureau, stop the manufacture of white phosphorus matches on a given date. The only thing they asked for was such a bill as was put through which would make it inconvenient and expensive for any new concern coming into the industry to use white phosphorus, and thus produce a match at less cost. So this bill was constructed to put such tax on white phosphorus matches as would make it impossible to sell them at a rate below what might reasonably be charged for red phosphorus matches. The men already in the industry having agreed to it and as its sole purpose was to keep future competitors in the industry from using a cheaper material, there was no desire upon the part of anyone affected by the bill to test its validity. As it stands, any person who now wished to make matches from white phosphorus first would have to go to the expense of testing the constitutionality of that law. Such procedure would have the effect, probably, of deterring anyone from going into the match business, or if they did, they would figure that it was cheaper to use red phosphorus than it would be to go to the Supreme Court on the constitutionality of that law.

For the reason stated, this law has never been tested. For very obvious reasons I do not care to discuss the probability as to the vote on the act, if it ever got before the Supreme Court. However, with this practically agreed upon bill, the discussion on the floor of the House went rather deeply into the philosophy of the thing. The opponents of the bill quite generally conceded the power of Congress to act in the case, but insisted it was inadvisable or improper so to act because such legislation encroached upon the domain of the police power of the states. The power of Congress to tax has long been held to "carry with it inherently the power to embarrass and destroy." (McCullough v. Maryland [1819], 17 U. S. 316, 431; and again in 1868, 74 U. S. 694, 699, Austin v. Alderman.)

It was brought out on the floor that the purpose of the tax was to bar the manufacturer of white phosphorus matches and not to raise a revenue. This fact was alleged as a reason against the measure. However, it is settled "that the motive or purpose of Congress in adopting tax legislation may not be inquired into." (McCray v. United States [1904], 195 U. S. 27, 59.) It is conceded that by an exaggeration or perversion of this power, Congress might destroy the fundamental rights, but in the opinion of the court the manufacturer of colored oleomargarine was not such a perversion of the use of this power (McCray case, page 63). However, we must not forget that this was upon theory number three as stated above, that is, on the basis of its tendency to deceive rather than upon the fact of its actual injury to person or health.

PHOSPHORUS POISONING

The Bureau of Labor Statistics has no administrative powers and desires none. Our interest is principally in bringing together the arguments, statistical or otherwise, in favor of hygienic conditions of labor. We have at present in manuscript a completed report upon phosphorus poisoning among employes in fireworks manufacturing establishments. This is confined essentially to the manufacture of a particular kind of fireworks variously known as "spit devils," "devils-on-the-walk," "sons-of guns"—these being various names for practically the same thing. It is that form of fireworks which the juvenile Fourth of July enthusiast throws upon the sidewalk and then scuffles them with his feet, where they explode with a crackling noise and sparks fly in every direction. I have here a sample of what I mean.

The investigation is now completed and being prepared for publication. In this investigation which covers four states, we have approximately a score of cases of phosphorus necrosis, some of them very bad cases. There have been several deaths.

One state, Louisiana, has passed a law against the importation or sale within the state of spit-devils or any of its type of fireworks. I wrote to the State Board of Health asking about the background leading up to the enactment of this law by the legislature of Louisiana. In reply, he sent me the death certificates of two girl babies. One was less than 2 years old, and the other a little over 2 years old, who had eaten these fireworks and had died from phosphorus poisoning. I think it is this social background, the death of babies, more than the disease of workers in the industries that ultimately secure both state and congressional legislation. This is where a more complete and satisfactory understanding and coöperation between the Public Health Service and the Bureau of Labor Statistics would be effective.

From several states we have death certificates of children who have died from eating spit-devils or similar articles. Of course we

will make use of these in our report, although they cannot be classed as a result of industrial disease. In our phosphorus study we came across a number of deaths of children from eating rat poison containing white phosphorus. We have, however, been unable to locate a single instance in the manufacture of rat poison where occupational poisoning can be established. As a matter of fact, even the largest concerns prepare rat poison in batches where the workers are not employed at that particular work more than a week or two at a time, at the very outside, and it is not an industrial or occupational hazard within the meaning of the functions of the Bureau of Labor Statistics. On the other hand, it is probable that just as many, if not more, children are killed by rat poison than are killed by spit-devils. This, however, must necessarily be handled by the Public Health Service or the health services of the various states, as it is not a labor question.

INDUSTRIAL HAZARDS IN RADIUM

Our report on radium is not yet complete. We are still gathering material and we are still struggling with some academic technicalities which have developed in law suits for damages that have grown out of radium cases. I have neither the time nor the inclination to go into the question as to whether it is radium or mesothorium that is the active poison in this case. Even though the necrosis symptoms be entirely due to mesothorium the fact remains that radium presents industrial hazards not only in the form of occupational disease, but social hazards. Personally I had practically conceded that the incident of necrosis was due to mesothorium until the other day I read a case of a man getting necrosis of the jaw from employment of radium in the treatment of cancer of the tongue.

What I am more interested in than the immediate subject of federal control of dangerous poisons, however, is federal control of the shipment across the state lines of unprotected and unsafe machinery. The number of deaths from industrial accidents range from 22,000 to 28,000 per year. Industrial accidents not resulting in death number 1,250,000 a year. Mr. Tobey states that manufacturers are responsible for results in case of improperly packed or carelessly labeled poisons, and cites the case of a package of lye. I do not know to what particular case he refers. But the New York Supreme Court in the cases of Rosebrock v. General Electric Company (1925), 236 N. Y. 227, 140 N. E. 571; Statler v. Ray Manufacturing Company (1909), 195 N. Y. 478, 88 N. E. 1063; and Ferguson v. Schultz (1908), 192 N. Y. 156, 84 N. E. 956, would seem to be inclined to favor a construction broad enough to meet the desires of the Bureau of Labor Statistics, which briefly stated are: that not only shall Congress prohibit interstate commerce in hazardous substances, in which case I think you will agree that the Bureau of Labor Statistics started the ball rolling, when the white phosphorus match bill was passed, but that it shall also prohibit interstate commerce of dangerous and unguarded machinery so far as safety appliances can be and ought to be made a part of the machinery itself, or a part readily attachable to the machine.

Bronchial Asthma in Children and Young Adults—Rowe presents a series of 110 cases of bronchial asthma in children and young adults and gives his conclusions as follows:

Many disturbances of the respiratory tract in childhood and in young adult life are due to allergy. Asthma occurs frequently during these years and is often mistaken for bronchitis. Careful testing and retesting with a large number of all classes of proteins known to cause asthma has given positive reactions in 95 per cent in our series of 110 patients. Asthma has been shown to be due to animal emanation, food and pollen proteins in a large percentage of our cases.

The importance of pollen sensitization as a cause for asthma in the first two decades of life must be especially emphasized. Surgery on the nose and throat is contraindicated in asthmatic patients, except for the improvement of general health. It is unnecessary to change climate to control asthma. With steady cooperation of the patient, we have obtained satisfactory results in 91 per cent of this series of asthmatic subjects.—*Am. J. of Dis. Child.*, Jan., 1926.

PROTECTION OF HIGHWAY WATER SUPPLIES*

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THE SOURCES of water supply along our public highways have of late assumed a far greater importance in state public health programs than they ever did before the day of the automobile and the improved road.

THE GENERAL PROBLEM

State health departments have long recognized the necessity for the supervision of public water supplies and by continued effort have succeeded in securing adequate protection of the majority of these supplies. Work of this kind has been at times very difficult of accomplishment and there are still cities whose water supplies cannot be classed as safe, but in those states where an efficient sanitary engineering division is functioning as a part of the state health department the number of unsafe municipal water supplies is becoming less each year. The fact that the water in most of our cities is safe to drink gives the inhabitants of these cities a feeling of security and they do not realize that all of the waters which are found along the highways are not of the same satisfactory quality as that to which they have been accustomed in their own homes.

We must recognize the fact that in spite of our educational work the average citizen has but a very hazy idea of the sanitary requirements of a safe water supply. If the water is clear, cold, and pleasing to the taste the general public is satisfied that it is safe to drink, and the average citizen will drink where water of this kind may be found. Let us admit frankly that our educational campaigns have not thus far produced results which make it advisable to let the average citizen judge for himself whether or not a safe drinking water may be obtained from a particular source. This is not a criticism of the methods of health education which have been used but rather a recognition of the fact that the work has not yet accomplished all that we hope it ultimately will do.

The steadily increasing mileage of improved roads which radiate from our cities makes it possible for the city motorist to go almost anywhere that his fancy dictates and he can travel as far into the country as time and speed limits will permit. There seems to be an inbred longing in most city dwellers to get out into the open country. The radius of an automobile owner's environment is many times greater than it was before he drove a car.

Touring by automobile is becoming more popular every year. The amount of tourist travel over our public highways has become so great that the business of supplying the needs of tourists along our main highways has become very important. Most cities and towns provide public camping grounds where the tourist may camp if he so desires. These municipalities feel that it is worth while to provide suitable accommodations in order that the tourist may carry away with him a favorable impression of the community. Tourist travel moves over considerable distances and differs in this respect from

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the city to country travel. Together they form a large percentage of the traffic on state highways.

These increased movements of population mean, from a public health standpoint, increased possibilities of infection. If the progress which has been made in the control of food and water supplies and the sanitation of the environment in our cities is to be maintained, the attention of public health officials must be given to the supervision and control of food supplies, water supplies and sanitation along the state highways. Work of this kind is statewide and should properly be handled by the state department of health. In some states investigation, control, and supervision of wayside refreshment stands, sanitation of tourist camps, and roadside sources of water supply have been inaugurated. Only one phase of the problem which the use of automobiles has brought will be discussed here—the control of highway water supplies.

Water is a necessity for the comfort and convenience of motorists and in most sections of the country may be found at intervals along the highways. The undeveloped sources are roadside springs, small streams and rivers. The developed sources may be divided into two general classes. The first class includes developments generally supplied under pressure. These supplies furnish considerable quantities of water through small distribution systems, either by gravity or mechanical pumping, and are found at hotels, inns, restaurants, consolidated schools, factories, country clubs, and small villages. In the second class the supplies are generally developed to furnish only a small quantity of water. This class of supplies includes the small wells in the school, tourist camp, summer resort, church, garage and gasoline filling station, and that by the roadside. All of these sources of water supply are found along our state highways and they are used by the average motorist without much discrimination.

The automobile has given considerable importance to these roadside supplies. Most of them were originally developed to serve only a few people and were essentially private supplies. Now their proximity to the highway and the consequent use of them by greater numbers of people make it advisable to classify them as semi-public water supplies. The diversity of sources and types of development, together with a lack of knowledge of the sanitary requirements of a safe water supply on the part of the average motorist, makes it almost impossible for him to discriminate between water supplies that are reasonably safe and those that are of questionable quality. As a result of observations made during the investigation of roadside water supplies on 2,000 miles of state highways the writer came to the conclusion that the average motorist pays very little attention to the sanitary surroundings or the type of construction of a roadside water supply. Investigation and control of roadside water supplies by state departments of health seem to be necessary if the dangers involved in the indiscriminate use of such water supplies are to be controlled.

Briefly stated, a workable program for the control of roadside or semi-public water supplies must take into consideration the following factors:

1. The greatly increased use of such supplies which results from the increased movements of population made possible by the automobile and improved roads
2. The variety of sources of water supply and types of development of these sources which are to be found along the highways
3. The fact that the city resident has come to accept a safe water in his home as a matter of course
4. The inability of the average citizen to judge by inspection whether or not a roadside water supply is safe.

PRESENT STATUS OF THE WORK

During the past summer the writer has attempted by correspondence to obtain information in regard to the present status of roadside water supply work in

this country. Replies have been received from the state health departments of 40 states. Definite programs for marking safe sources of water supply along the principal highways are being carried out in 10 states.* Sanitary surveys and bacteriological examinations of roadside water supplies are being made in 5 states,† but no signs have been erected. The water supplies at tourist camps are supervised by the state health departments in 3 states.‡ Preliminary investigation of the problem has been started in 2 states.§ No information was received from 8 states.‖ There were 20 states reporting that no work of this kind had been done.

Although no "safe" signs have been erected it has been the practice of the Rhode Island State Department of Health for some years to examine all public wells and springs, including roadside supplies, at least once each year. In case wells or springs are found to be unsafe the local health officer or town having jurisdiction is directed to close them to public use. Work of this kind indirectly accomplishes the same result as the posting of safe supplies. On the basis of available data Rhode Island was the first state to attempt definite control of all the roadside water supplies within its boundaries.

THE WORK IN OHIO

The idea of placing some form of sign to inform the public where safe drinking water might be obtained along the highways seems to have originated in the Ohio Department of Health. Ohio was the first state to undertake this work and the programs in other states have been quite generally based on the methods and experience obtained in Ohio. It is for this reason that the plan followed in Ohio will be described in some detail.

The work is being carried on by one sanitary engineer and one medical man assigned to it from another division of the department. Considerable work is being done by district health commissioners who are competent to perform the necessary work. In such instances, however, the results are finally checked by the state department of health. The field work consists of sanitary surveys of the sources of water supply which are available to the public along the highways. The data obtained by the surveyor is entered upon a special blank entitled "Report on Semi-Public Water Supply." This report covers the location of the supply, type of supply, structural conditions and the location of possible sources of contamination.

As a rule duplicate 4 ounce samples of water are taken from each source which is examined. There are exceptions when the source is obviously unsuitable. These samples are sent to the central laboratory at Columbus or to the laboratories of local health departments for examination. The time of transportation from field to laboratory never exceeds 24 hours. All samples must show absence of *B. Coli* in 1 and 10 c.c. portions in order to be declared satisfactory. If the first samples give unsatisfactory results a second set of samples may be taken if in the judgment of the investigator the water supply development is of such character that it should produce a safe water supply, or if after the first sampling improvements to the development are made which would warrant resampling. The results of the laboratory examination are entered in a space provided on the report form used for the sanitary survey. The completed report thus has complete field and laboratory data on the source of supply and enables the State Department of Health to determine whether or not the supply shall be approved.

* Connecticut, Delaware, Illinois, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, and Washington.

† Arizona, Maine, New Mexico, Rhode Island, and Virginia.

‡ Maryland, Texas, and Utah.

§ Florida and West Virginia.

‖ Arkansas, Idaho, Indiana, Nebraska, Nevada, North Dakota, Oregon, or Wyoming.

A water supply development when found satisfactory from the above viewpoints is advertised as such by a seal or certificate of safety. The seal of safety, a small yellow enameled metal disc, is used on the hand pumped well and is so placed on the pump barrel as to be easily visible to any user of the supply. These seals are serially numbered and dated. The supply developed under pressure such as is found at the modern centralized school, country club, etc., is indicated as safe by a certificate of safety. This certificate, which is also numbered and dated, is framed and placed in the building in some conspicuous place.

Additional and more conspicuous markings are furnished in many cases. Certain automobile clubs throughout the state furnish and erect adjacent to safe supplies, standard metal club markers approximately 20" x 27" in size. The division of highways also supplies standard road signs marked "Safe Drinking Water 500 Feet Ahead." The latter signs are utilized only at supplies located along state maintained roads, while the former are used at any desirable location.*

Before the seal or certificate of safety is placed on an approved source of supply a formal agreement between the owner, lessee, or tenant of the property upon which the supply is located and the Ohio Department of Health is signed in duplicate.

The department agrees to place at said water supply a seal or certificate to indicate its safety and to arrange for the erection of a sign on said property to show the presence of a safe water supply. The owner, lessee, or tenant agrees to permit the placing of these signs and further agrees to permit the removal of the signs when such removal is deemed advisable by the department of health. A definite agreement of this kind prevents misunderstandings on the part of the person controlling the supply. It gives him an opportunity to state definitely whether or not he wishes to have the supply marked and also makes it clear that the continued approval of the source of supply is a matter to be determined by the department of health. In Ohio periodic reëxaminations of these approved supplies are made by the county health departments.

* Semi-Public Water Supplies. *Administration Bull. No. 137*, Ohio Department of Health.

WORK IN OTHER STATES

Arizona—Wells and springs are not found along the roadside. The water supplies at established camps and resorts are inspected. Samples of 100 c.c. are taken from these sources and the safety is judged by the U. S. Treasury Standard, the opinion being based on a series of samples as the department feels that the results obtained on a single sample are only an indication of the probable quality of the water.

Connecticut—In this thickly populated state, with public water supplies at near intervals roadside water supplies are not a serious problem. Occasional inspections and sampling of roadside waters are done by two men who are engaged in the inspection of summer camps. No second sample is taken unless the results are doubtful. Distances are short so that samples are taken to the laboratory each day. Results are judged by the U. S. Treasury Standard. Unsatisfactory sources of supply are posted as unsafe.

Delaware—The department of health does not make a systematic survey of all the semi-public roadside water supplies. Instead, they select service stations at intervals along the highway and expect the public to obtain drinking water at these approved places. The signs are paid for by the owners of the service stations but are erected and maintained by the state highway department. The signs advertise "Safe Water and Sanitary Toilets."

Illinois—The work on roadside water supplies in Illinois was started in 1924. During that year about 200 samples were taken and 10 per cent were found satisfactory. The work this year is being done by one man with a car who makes the inspections, collects the samples, and later posts the sign on the approved supplies. No samples are taken from those sources which the sanitary survey shows to be unsatisfactory, but the owner is advised to make the necessary improvements. When the results of the laboratory examination are not up to the U. S.

Treasury Standard, the supply is resampled. If several analyses are unsatisfactory the supply is condemned. Records of the work are filed in the office by route number and direction.

Kentucky—A small amount of work on roadside waters has been done during this year. Samples are taken in 125 c.c. quantity and sent to the central laboratory by mail. The U. S. Treasury Standard of purity is used to judge the results of laboratory examinations. Signs are posted by the county health officers.

Maryland—No approval signs are used. The water supplies at tourists' camps, which are leased from the state roads commission, are supervised by the state department of health. Sanitary surveys of these sources of drinking water are made and samples for both bacteriological and chemical analysis are taken. Additional samples for bacteriological examination are taken only in those instances where the sanitary survey and the chemical analysis are satisfactory. Maryland and Rhode Island are the only states reporting the use of a chemical examination as a part of the laboratory work.

Massachusetts—No work of this kind has been done for the reason that under existing laws in this state the state department of health has no right to mark a water supply on private land as to whether it is good or bad. The supervision of roadside water supplies comes within the duties of the local board of health. Massachusetts is another thickly populated state where public water supplies are not far apart.

Michigan—The following description of the work in this state was received from the director of the bureau of sanitary engineering.

A touring car with sample bottles and packing materials goes over the main trunk line highways and inspects water supplies where automobile travelers would be tempted to drink. If the surroundings of the drinking place seem favorable and if more than just a few persons drink at a given point each day, a sample is taken. Samples are stored in the car in a homemade box insulated against heat by making its walls of double boards with corrugated paper between them. Ice can be kept in this box during hot days. The collecting of samples is stopped toward the end of the afternoon and the samples are wrapped with corrugated paper and packed in cartons with cotton to prevent breakage. The package is mailed as close as possible to the departure time of mails so as to travel at night. Ordinarily the package reaches the laboratory in the first mail next morning and always before noon. The analysis is started within a very short time after the samples arrive.

About 2 weeks behind the first car is another carrying the man who puts up the signs as near the well as possible. This man should visit all places where samples have been taken and give instructions, particularly to those whose wells have been found unsafe. An experienced man should be used on the work of posting. The collector can be taught how to do his work in a few days. A full description of each source is necessary and hard to get from an inexperienced collector. There is always a tendency to hurry too much.

Sample points are spotted and numbered on county maps (scale about 1 mile per inch) and a brief description is given. This enables the poster to find the place. When he arrives he asks for the letter from the office as a verification of the identification of the source and as a check on his record. From July 17 to September 11 four trunk lines were covered and 417 regular samples taken.

Blanks describing the source and surroundings are made out when the sample is taken. One copy goes to the laboratory and one to the engineering bureau and these are mailed at the same time as the samples. The results of the analysis are put on the laboratory copy of this blank and sent with copies to the engineering bureau. The director of the bureau makes the decision on the basis of the analysis and the description of the source and writes a letter to the owner of the well giving the decision as safe or unsafe for drinking. The copy of the original blank sent to the engineering bureau is to guard against losses of these data in the mails.

Minnesota—The division of Sanitation of the state board of health coöperates with the state highway department in the control of those roadside water supplies which are within the highway right-of-way. The highway department has submitted a list of all the roadside water supplies developed by them on trunk highways. Nearly all of these supplies have been investigated and have either been improved so as to make them satisfactory or the signs removed. The division of sanitation has prepared plans and specifications which are followed by the

highway department in developing new sources of supply. Most of these supplies are from springs. The signs placed on approved sources of water supply by the highway department advertise "Drinking Water—This supply developed by the Minnesota Highway Department. Approved by the Minnesota State Board of Health." This is an interesting example of the possibilities of coöperation between the state board of health and the state highway department in procuring satisfactory roadside water supplies.

Missouri—An interesting feature of the Missouri "Seal of Safety" campaign for the improvement of water supplies at summer resorts and along the state highways is the inclusion of other sanitary conditions about the premises in the requirements for a Seal of Safety certificate. After a sanitary survey has been made, a report with recommendations for improving sanitary defects is given to the owner of the premises. The Seal of Safety certificate indicates that both the premises and the water supply meet the sanitary requirements of the state board of health. Water samples are collected when the sanitary survey is made and sent by mail or express to the central laboratory. The time of transit averages 24 hours. Resamples are taken after the recommended improvements have been made.

New Mexico—Work is being done in 10 counties through full-time county health units. Sanitary surveys and laboratory examinations are made. In those instances where the source of supply is satisfactory from an environmental and structural standpoint but unsatisfactory from a bacteriological point of view, the source is given a heavy dose of hypochlorite of lime. Another sample is collected at a later date. No signs are erected.

Pennsylvania—Work on roadside water supplies has been carried on during the last 2 years. The outstanding feature is the use of field water laboratories. During the summer of 1924 the field work was done by a party consisting of a sanitary engineer, who made the sanitary surveys, a bacteriologist and a representative from the restaurant hygiene division. The field equipment consisted of a Ford roadster and a fully equipped field water laboratory. Samples of water were stored in a large vacuum jar during the day and the bacteriological analyses were always started within 6 hours after the sample was taken. This arrangement was very satisfactory as the uncertainty of the condition of the sample during shipment to a central laboratory was eliminated. Samples were also collected from all of the public water supplies along the routes covered by the field party. The reports of the sanitary survey together with the results of the laboratory examination of a sample from the source were sent to the central office for action. The safe drinking water signs were put up on approved sources by the local health officers.

The organization of the work in Pennsylvania has been changed somewhat this year. The inspection work is now handled by the district engineers and an additional field laboratory has been in service. As the district engineers reside in their respective districts, this makes it possible to give more attention to the follow-up work incident to the surveys. The method of marking the approved sources of water supply and the form of agreement with the owners is practically the same as those used in Ohio.

Texas—Only the roadside water supplies which are found at tourist camps have been investigated. The engineering division of the state board of health has formulated a very excellent plan for the sanitary control of these camps. Attractive signs are put up to indicate that the camp has been approved. The usual procedure is followed in the investigation and control of the camp water supplies.

Utah.—Work similar to that in Texas is being done in Utah, but no signs are used.

Virginia—Some preliminary work has been on parts of two of the main highways. This work was undertaken primarily with the object of finding out exactly what kind of a problem is involved in trying to cover all the main highways of the state. One of the interesting results of this work is the discovery that only a small percentage of semi-public supplies outside of cities is such as can be certified as being safe. The policy followed thus far has been to make the sanitary surveys on a certain highway and after these are completed to collect as many samples as possible during a day and take them into the laboratory that same day. No signs have been erected.

Washington—Work on the investigation and control of roadside water supplies was begun this year. The State Sanitary Engineer makes the sanitary surveys and collects the samples. After receiving the laboratory report he sends a list of the sources of water supply which are to be posted to the Automobile Club and to the state highway department. The Automobile Club ships the signs to the division engineer of highways who directs the maintenance department to erect them in the locations ordered by the health department. Each sign is numbered and a record is kept by each of the three agencies concerned.

West Virginia—This state is making a preliminary survey of the problem in connection with tourist camp work. A coöperative program between the state road commission and the health department will be followed out.

CONCLUSIONS

While the control of roadside water supplies is a comparatively new phase of sanitary engineering work the problem has been attacked by state departments of health in nearly every section of the country. Variations in climatic conditions, the progress of the improved road programs, and the density of population in the different states all affect the seriousness of the problem.

The plan of definitely marking satisfactory sources of water supply along the highway as "Safe" or "Approved" has not been so generally adopted in the different states as has the general plan of supervising these supplies. There is evidently a feeling in some departments that the matter of signs should be attacked from the negative rather than from the positive side, that is, that the posting should be done only at unsafe sources of supply.

Another interesting development of the work in some states has been the coöperation between the state health and highway departments in developing and maintaining sources of water supply within the highway right of way. It is the opinion of the writer that in many instances the installation of sanitary toilets in the vicinity of such sources of supply would add to the comfort and convenience of the motorists and at the same time decrease the possibilities of contamination of the water supply.

The control of highway water supplies is too new to evaluate it from a public health standpoint. It is hoped that data will gradually be collected which will show its effect on the prevalence of vacation typhoid fever. This is a type of work which the public understands and which has received very general approval. The favorable sentiment which the control of roadside water supplies has created, in the states where this work is being done, should help in obtaining more adequate support of the entire public health program.

DISCUSSION BY W. H. DITTOE, FELLOW A.P.H.A.

The Ohio Department of Health undertook a systematic examination of semi-public water supplies in February, 1924. Prior to this time state supervision of public water supplies in Ohio had been established, but examination and supervision of semi-public water supplies had

not been attempted on a broad scale. When this work was undertaken it was believed that there was a necessity for it and the results which have been secured to date have supported this opinion. The work has been carried on continuously since February, 1924, with 1 to 3 men constantly employed, and it is expected that it will be continued as a permanent activity. While the water supplies examined have included semi-public water supplies of all kinds, particular emphasis has been placed upon those supplies which are available to the motoring public.

The unique feature of the work is the use of seals, certificates and signs intended to inform the public of the availability of a safe water supply. Instead of tagging or otherwise marking unsafe supplies and thus warning the public, the system comprises the marking of safe supplies and thus inviting the public to use them. Therefore a positive rather than a negative announcement is made to the public. When a water supply is found which is unsafe and cannot be satisfactorily improved its abandonment is secured either by persuasion or through the medium of an order. For the purpose of euphony in the publicity features of the work the phrase "Seal of Safety" was adopted to denote the seal used in designating a safe water supply.

From February, 1924, to October, 1925, approximately 1,850 miles of the state highways in Ohio were covered in this work. Some 1,450 water supplies along the highways were investigated. Of the total only 105 supplies have been given the seal of safety. A large percentage of the other 1,300 supplies are fairly satisfactory and with improvements made in their protection they would merit a seal of safety. It may be of interest to note that of the 105 water supplies declared safe 102 were drilled wells, 2 were springs, and 1 was a dug well. The 105 supplies represent only about 7 per cent of the total number of the water supplies examined. It should be stated that rigid standards of safety with respect to location and development of water supplies are adhered to. This may in part account for the low percentage, but regardless of this factor it is apparent that a large percentage of the water supplies investigated were found to be unsafe. This fact appears to justify the effort made in providing for examination and supervision of this class of water supplies.

It is believed that this work has a distinct value in the general effort of public health protection. The outstanding value is in the actual improvement of water supplies of this class. It has been found generally that the owners of such water supplies have been willing to make any improvements which are considered necessary by the department of health. This has resulted, and will continue to result, in general betterment. The second item of value is the educational feature of the work. It is well known that private water supplies as a general class are poorly protected and unsafe. It is almost hopeless to attempt supervision and examination. Through the Seal of Safety campaign we believe that a means has been found to demonstrate to the rural public the proper methods of well development, which demonstration will tend to bring about improvements in private water supplies.

This work is essentially a public service and therefore fits in well with a comprehensive program of public health administration. We have found that the work is extremely popular as it gives to the public a new service which is generally appreciated. Apart from this valid reason for carrying on the work, however, the experience in Ohio thus far has indicated its necessity and value in the general effort of improvement of water supplies of all classes.

MOSQUITO CONTROL*

MOSQUITOES were unusually rampant in practically all sections of the country during the past summer. The chief cause was the weather, which greatly favored their production. There was enough rain in the North and West to provide ample breeding places and long periods of humidity to favor the rapid production of the insects. The lack of rain in the South, however, intensified sewage pollution of streams resulting in a marked increase in Culex production. Observations in New Jersey developed the striking and disturbing fact that one result of such wet, humid weather was that the life cycle of two or three species of mosquitoes was found on several occasions to have been reduced from the usual warm weather period of 7 or 8 days to 5 days which further complicated matters. It was evidently a "so-called" insect year, as flies, moths and many other kinds of insects were reported in enormous numbers very generally throughout the country. One lesson of this trying season is that to satisfactorily meet such an emergency mosquito fighting units must be so organized as to provide for the greatest possible expansion.

In its investigations of progress in mosquito control throughout the country your committee has assembled the following data which are submitted for your information:

1—Operations were carried on very generally in 11 states.

2—Activities in a limited degree were reported in 10 states.

3—No control whatever has been undertaken in 27 states.

* Report of the Committee on Mosquito Control presented to the Sanitary Engineering Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 21, 1925.

GENERAL LINES FOLLOWED

A brief description is given of the principal features of anti-mosquito work in the states of the first group:

New Jersey—The control work in New Jersey which has been thoroughly organized for some time was continued this year along the same general lines as heretofore. The total amount of money expended for the year will be about $325,000, approximately the same as the preceding year.

The most outstanding feature in the work in New Jersey during the past 2 or 3 years is the development of machinery for certain drainage operations. This year the construction of a ditch cutter was completed by the State Experiment Station which is designed to cut the regulation straight-sided ditch adopted as the standard in that state. The cutting and tractor units are combined with one power plant of 45 horsepower. A 5-ton Holt tractor was remodeled so as to provide caterpillars with 4-foot treads and a 15-foot wheel base upon which the cutting device is mounted. The cutting is done by 36 steel buckets carried on an endless chain belt. The sod removed is chewed up and spread over an area 30 feet in width which it is claimed will prevent blockage often occurring by sods being washed back into the ditch. The usual chain drive has been improved upon by the installation of a direct steel gear drive of great strength. The total weight of this sturdy machine is 12 tons, but it is interesting to note that the ground pressure is only 1½ pounds per square inch, which is about equal to that of a man of average weight. The machine is so sensitive that it can be operated by one man, though the use of two is planned.

Experiments indicate a speed of 40 feet per minute and the cost of foot per ditch cut as somewhat less than ½ cent, as compared with 1½ cents for the type of machine now in use, and 3 cents for handwork. It can be readily seen that great economy will be effected with the saving of approximately 70 per cent in the cost of ditching and an increase in the number of feet cut. The cost of the experimental machine was $10,000, but it is believed that it

can be reproduced for about $8,000. The official test of the machine will be held in the early part of November, 1925.

There has been no change in the design of the ditch cleaning machine described last year, but certain refinements have been worked out by the designer recently, involving the more extensive use of steel. The improved machine will probably cost between $4,000 and $4,500. The use of the machine in cleaning work, however, will effect a great economy even at that price. The machines were successfully operated in the season just closed in 5 counties in New Jersey.

In relation to methods of raising funds for mosquito control work, it is interesting to note that the state law, under the provisions of which control operations are carried on by the county units (which statute has been widely discussed as being a model of anti-mosquito legislation), was recently supplemented by the passing of an act enabling county boards of freeholders to bond a county when the need exists up to the sum of $300,000. The chamber of commerce of one county in which work has been backward is supporting a movement seeking the appropriation of $200,000 under the terms of this act for the purpose of completing salt marsh drainage.

Florida—Considerable interest in mosquito control work has been shown in Florida. The Florida Anti-Mosquito Association succeeded in getting a bill passed at the last legislature enabling any community to organize a mosquito control district. The bill is similar to those in vogue in New Jersey and California. Two communities in the state are preparing to avail themselves of the provisions of this new act. There are several cities engaged in anti-mosquito control work, although the interest in the state as a whole has somewhat subsided for the present, owing to the tremendous activity in real estate. Thousands of acres of swamp and low lands have been reclaimed by hydraulic fill methods during the past year. The present land development programs of necessity include thorough drainage and are perhaps doing more for the actual control of mosquitoes than all the educational propaganda formerly promulgated.

Mississippi—There are some 40 towns engaged in anti-mosquito operations, principally from the standpoint of malaria control with considerable activity directed against the pestiferous mosquito also. The highest death rate for malaria obtains in this state. Marked reduction of malaria has resulted from the work in several counties. There are 12 active full-time county health departments engaged in mosquito work.

Texas—In addition to the border campaign many towns are doing mosquito control work. The State Department of Health has an appropriation of $10,000 for this work, supplemented by outside agencies. The Engineering Division directs the work through an expert who organizes local forces for surveys and actual operations, under municipal ordinances made for the purpose, which are financed by each locality. With this procedure more or less intensive work is carried on in over 100 communities, resulting in a very material reduction of malaria cases. The top-feeding minnows are also used extensively. In order to obtain the maximum of efficiency in the work a school for sanitarians is held each year. The attendance at a recent 4-day session of the school was 500. Thirty-six towns employ whole-time inspectors and in 62 towns part-time inspectors are engaged in the work.

Railroad Coöperation—The Cotton Belt and the Missouri Pacific railroads are both working in coöperation with cities and towns along their lines in malaria mosquito eradication campaigns. With the development of these plans practically every railroad west of the Mississippi in Texas, Arkansas and Louisiana, will be conducting campaigns of their own or supporting the health authorities in this work. It is interesting to note that an anti-mosquito demonstration was conducted under the joint auspices of the Missouri Pacific Railroad, the Arkansas State Bankers' Association and the State Board of Health, thus securing the cooperation of the banking and agricultural interests.

Mexican Border Campaign—The following information was furnished by Colonel Joseph A. Le Prince, Senior Sanitary Engineer, United States Public Health Service, who directed the very excellent work on the border: The operations included 68 villages in the triangular area between Brownsville, Del Rio and Corpus Christi. The problem was the control of mosquitoes breeding in containers to prevent Stegomyia production. It included the inspection of 108,500 premises where 16,800 barrels were used for water storage. Sixty-four per cent of them were eliminated and 86 per cent of those remaining were protected against breeding; 5,800 cisterns were under inspection,

of which 73 per cent were protected permanently against breeding. In May, 1925, less than 1 per cent of all containers were producing any kind of mosquitoes.

As you no doubt know, this border campaign was conducted for the purpose of preventing yellow fever from entering the United States from the fever-ridden country to the south, and was a striking success.

Alabama—Control work has been under way for 10 years, organized largely through county health officers. In 1922 regulations effecting the impounding of water were passed and have been rigidly enforced. Control work has been carried on in 23 counties. The cost in 1924 was $33,000. Eleven hundred places were stocked with top minnows. Extensive educational campaigns were also carried on. It is interesting to note that the Muscle Shoals pool covers an area of 17,500 acres and is under control. A larger one with an area of 38,800 acres is under construction.

Georgia—Forty cities and towns are doing malaria control work with additional activities in certain rural sections.

LIMITED ACTIVITIES

The states included in the second group have shown only a minor death rate from malaria in recent years except in the case of Kentucky.

Kentucky—There is a limited personnel attached to the Board of Health in this state and their attention is directed to intestinal diseases rather than to malaria.

Massachusetts—Control operations have been carried on for a number of years in certain sections by the Massachusetts Society for the Control of Mosquitoes, embracing educational measures conducted with the idea of eliminating the house mosquito. Some saltmarsh work was done, the most notable of which was on Cape Cod in a fight to control mosquitoes said to assume fantastic proportions.

Maryland—Anti-malaria work was carried on in three communities in Maryland with satisfactory results.

New York—Intensive control has been limited to Nassau County, where the work has been conducted since 1916 by the County Mosquito Extermination Commission along the same lines as in New Jersey. Excellent results have been obtained, their annual expenditures ranging from $50,000 to $80,000. Inspection and maintenance, both essential to success, are systematically carried on.

In New York City a very limited amount of anti-mosquito work has been done in recent years due it is said to insufficient funds being appropriated.

Illinois—The 12 most southern counties are considered by the State Department of Health as the "malaria belt." Mosquito control was started by the State Department of Health in 1922 and at the present time there are 12 cities conducting mosquito campaigns. The activities in mosquito control this year have been greater than in all previous years. An intensive campaign, inaugurated by the Gorgas Memorial Institute, which organization made the survey and organized the forces of the several communities in one unit and is directing operations, was conducted this summer in Chicago and its suburbs with very satisfactory results. The problem there is chiefly one of river and creek breeding on a rather large scale because of their employment as sewage outlets. House to house inspections conducted by 400 boy scouts showed an average of 40 per cent of houses breeding mosquitoes. Extensive control work was done by the Sanitary District of Chicago in the territory under its supervision and considerable progress was made at a cost of $25,000. There has also been organized an Anti-Mosquito Board of the Metropolitan District composed of leading physicians and business men. Rather interesting from the standpoint of financing is the information that a campaign for raising funds was put in operation in the suburbs early in the year with the women selling "A Dollar's Worth of Comfort" in the form of tags telling that the purchaser had contributed to the common cause in the war on mosquitoes.

Virginia—There are at present 25 towns doing control work. The cities of Norfolk and Portsmouth are maintaining the control of breeding in the reserve water supplies. Anopheles quadrimaculatus, the only vector of malaria in the state, has been found breeding only in ponds. Pond control has been found to be more economic and effective through fluctuation of the level. That is, ponds under control hold the water at as high a level as possible throughout the winter and lowering is commenced on June 15. Where much fall is possible, one foot is run out and when breeding resumes, another foot. Two or three droppings of the pond's surface of a foot each has always given control of Anopheles breeding.

Missouri—The problem of mosquito control

and malaria prevention is practically limited to the southeast section of the state. The problem appears to be one of ditch maintenance. Surveys are being planned to prove this point and it is expected that a campaign will be inaugurated for proper ditch maintenance. A survey of an impounded water project, on which construction work has begun, is being conducted with the coöperation of the U. S. Public Health Service. It is planned to conduct these surveys on all new projects which mature.

Connecticut—A limited amount of work is conducted by the State Experiment Station.

Rhode Island—Control work is carried on in several cities and towns, principally in Providence where operations have been conducted for 12 years, including the establishment of permanent drainage systems. Aid has been extended to the several communities by the state, amounting to $40,000 in 1923, and $20,000 in 1924.

California—One of the first states to take up the fight against mosquitoes, California is carrying on control operations in 17 abatement districts. The top feeding minnow was introduced in 1922 with excellent results.

In some of the states of the third group, we find that there is no mosquito problem; in others Culex mosquitoes are prevalent; and in still others there is Anopheles production with a consequent slight malaria problem receiving no attention.

It is interesting to note that in response to a growing demand along the Gulf Coast of Texas, Louisiana, Mississippi, Alabama and Florida for freedom from Aedes sollicitans the Division of Entomology of the U. S. Department of Agriculture has started the study and investigation of the problem. It is understood that the object of this movement is to make the Gulf Coast country attractive by freeing it from the mosquito pest, which will greatly enhance property values, as in any community.

Anopheles control, which was started by the U. S. Public Health Service in 1914, and carried to 13 states, is now being supervised by the state health departments. Requests for advisory assistance from incorporated communities have increased to such an extent as to greatly exceed the capacity of the health departments in some cases, due to insufficient personnel.

The expansion of anti-mosquito operations in the various sections of the country indicates the favorable trend of public opinion toward the elimination of this offending insect, whether of the malaria-carrying species or of the pestiferous branch of the family. In the South, as well as in the North, the principal object is that of conserving the efficiency of the individual and securing the benefit of comfort. In both regions campaigns are inaugurated every now and then and additional communities secure relief from an unnecessary evil.

The mosquito problem in all its phases is so definitely linked with sanitation problems that the sanitary engineer, whether engaged in governmental or industrial operations, may often start the ball rolling when he sees the need for mosquito control in a community where no initial work has been done. The phase of the work in which his counsel is especially valuable is that affecting the breeding of mosquitoes on private property which resulted during the past summer in the emergence of vast hoards of mosquitoes throughout the country.

Another field which, because of its temporary nature, may be overlooked is that of the tourist and organization camps increasing in numbers each year in many states. We hear of considerable activity in the prevention of typhoid in such camps, but in the twilight when the inspectors have ceased their labors, such a camp may become a popular resort for mosquitoes which unnoticed have wriggled into existence in some nearby pool of clear spring water, a favorite habitat of the malaria carrying branch of the family.

Assuming that anti-mosquito forces of a community were to eliminate or place under control all the known breeding places, the fight would not be won unless the serious coöperation of each individual householder was obtained in an effort to eliminate breeding places on his own premises, the existence of which no one else would know. There is, of course, nothing new in this fact, but we desire to stress the point for the reason that as mosquito control work advances toward completion, this phase of the subject must be given special attention, and an intensive campaign of education and publicity should be coördinated with active operations. The fact that a full measure of relief and comfort cannot be obtained unless he prevents breeding on his property must be emphatically and continuously brought to the attention of the individual.

News articles and talks to a limited number of people are not sufficient. The committee in-

vites attention to the following by way of suggestion: One medium employed in New Jersey was the showing of a motion picture reel, not only to clubs or in lectures, but in practically every motion picture house in the state. Another was the issuance to the higher grades of all schools of a mosquito manual especially prepared for the purpose. Seeking a new angle with a novel touch, Hudson County inserted a number of display advertisements in the leading newspapers, calling upon everyone to clean up breeding places and attaching the slogan "No Water, No Mosquitoes," which brought forth comments that would indicate that they had been read, a condition that did not prevail in the case of news articles. Local ordinances have been passed in some states making mosquito breeding a misdemeanor. A state law to that effect would be far-reaching and prove very valuable if enforced.

In 1922 and 1923, the physicians of a city in Georgia took an active interest in the educational phase of the work as part of an extermination campaign and obtained good results. Boy scouts were used to excellent advantage in house to house inspection in and about the city of Chicago this year.

In communities where no inspection force is employed for the purpose of locating mosquito breeding places, the police could report the accumulation of water in the open places and the services of both boy and girl scout units could be enlisted to inspect the water both in the open areas and on private property, reporting the breeding places found to the local board of health. Where the scouts have been used for that work, great interest has developed in their organization by their being given an opportunity to take part in public health work, and considerable benefit has resulted which otherwise would not have been attained due to the impossibility of the health forces being expanded to include this work when the need for it became apparent.

The following sidelights being rather interesting, are furnished for your information:

A member of your committee relates that while a passenger on a fog-bound steamer 5 miles off the Massachusetts coast in the latter part of August, he found sollicitans so troublesome as to be almost unbearable.

Proceeding farther north, the McMillan Polar Expedition reported in July from its station on the east coast of Labrador that mosquitoes were so annoying as to render sleep almost impossible for several days. It was stated that some of the men sought relief by climbing to the top of the ship's mast, by which action they followed the custom of the Egyptians in early ages making their homes in towers to escape the onslaught of mosquitoes.

A bit of news which reached the committee as to malaria conditions abroad is that there were 5,000,000 cases reported in Russia in 1924.

LOUIS E. JACKSON, *Chairman*
W. H. VAN HOBENBERG
ELLSWORTH L. FILBY
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RUSSELL GIES

NOTE: For their courteous assistance the committee extends its thanks to Col. J. A. Le Prince, Senior Sanitary Engineer of the United States Public Health Service, and the sanitary engineers of the several state boards of health who have supplied information as to conditions prevailing in their territory.

EFFECT OF STORAGE AND CHANGING SEA WATER ON CONTAMINATED OYSTERS

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IN THE February issue of the Journal, our experiments on the effect of chlorination on oysters contaminated with typhoid bacilli were reported. Through the exigencies of time and available Journal space the collateral experiments on the effect of changing sea water alone were not presented. These as well as observations on the effect of dry storage were held for report at this time.

When the increase of typhoid fever occurred during the latter part of 1924, it was noticed coincidently in inland as well as seaboard cities. When investigations showed that this increase of typhoid fever was attributable to contaminated oysters it indicated that *B. typhosus* must persist in dry, stored oysters for some time. Experiments were undertaken, therefore, to determine the time of survival of *B. typhosus* under storage conditions.

Oysters for these observations were dredged at West Sayville, Long Island, and sent immediately to the laboratory. The water was obtained from Great South Bay, Long Island.

Two lots of about 80 oysters were contaminated by suspending the oysters in wire crates in tanks containing about 8 gallons of contaminated sea water: Lot A, shown in Table I, in sea water contaminated by the addition of a suspension of feces containing *B. typhosus;* Lot B, shown in Table II, in water contaminated with freshly isolated cultures of *B. typhosus.* The tanks were kept overnight at room temperature (18 to 22° C.). The oysters drank actively. They were then removed from the tank for storage. The storage conditions approximated in temperature that of the colder months (February and March) of the oyster season. The oysters were kept out-of-doors in a small shed on the north side of a building which was covered with snow. When snow was no longer available they were transferred to an icebox.

TABLE I

Survival of B. Typhosus on or in Oysters, Contaminated with Feces, during Storage. First Examination February 4, 1925

Days of Storage	Estimated number of B. typhosus per c.c. of Liquor	c.c. of Body Emulsion	Shell
0	254	Not exam.	Not exam.
1	62	110	Not exam.
5	23	10	Not exam.
7	10.4	0.9	3111
9	20.4	1.85	194
10	2.5	+(<0.08)	142
14	2.5	1.6	Neg.
21	7.6	1.5	Neg.
28	1.3	+(<0.08)	Neg.
35	30.6	0.25	Neg.
41	1.5	+(<0.08)	Neg.
49	0.25	0.25	Neg.

TABLE II

Survival of B. Typhosus on or in Oysters (Contaminated with Freshly Isolated Cultures of B. Typhosus) During Storage. First Examination February 4, 1925

Days of Storage	Estimated number of B. typhosus per c.c. of Liquor	c.c. of Body Emulsion	Shell
0	37,700	2,118	Not exam.
1	13,870	1,260	Not exam.
5	10,333	1,077	Not exam.
7	7,107	450	Not exam.
9	4,514	473	2,733
14	1,245	515	2,750
21	5	100	Neg.
28	1.6	0.6	100
35	1.4	12	Neg.[1]
41	103	32	Neg.
49[2]	45	26	Neg.

1. Oysters removed on this date and placed in fresh sea water then showed 160 *B. typhosus* per shell, irregular distribution.
2. Oysters dead.

The materials used for bacteriological examination were: washings from the shell, using 10 c.c. of broth per oyster,

the removal of the contaminated material being assisted by rubbing with cotton swab; the liquor; and the body of the oyster emulsified in 5 c.c. of broth. The number of *B. typhosus* was estimated from the number of colonies on the plates or from the smallest quantity which when placed in an enriching brilliant green broth yielded *B. typhosus* on subsequent plating.

The effect of dry storage on the numbers of *B. typhosus* on or in contaminated oysters is summarized in Tables I and II. The number of typhoid bacilli as shown in Tables I and II was greatly reduced, but bacilli still could be isolated from both liquor and body after 49 days of storage. Before this the oysters had begun to die and those examined on the last day of the experiment were unfit for food. The number of *B. typhosus* per shell was very low after 2 to 4 weeks' storage; the shells of the more lightly contaminated oysters being negative after 2 weeks, whereas with the more heavily contaminated ones the last positive finding was after 5 weeks' storage.

TABLE III

SURVIVAL OF B. COLI IN OYSTERS, CONTAMINATED WITH B. COLI, DURING STORAGE. FIRST EXAMINATION FEBRUARY 4, 1925

Days of Storage	Estimated number of B. coli per c.c. Liquor	c.c. Oyster Body Emulsion
0	82,000,000	200,000
1	425,000,000	25,500,000
6	183,000,000	250,000
8	685,000	25,000
10	550	50
21	5,050	505
28	50	5,050
35	50	550
41	1	5.5
49[1]	10	1

[1] Oysters dead.

A parallel series of observations on the persistence of *B. coli* was also carried out using the presumptive broth fermentation tube method. The results of these observations are illustrated in Table III. In this table as in Tables I and II all of the examinations are not recorded but only a sufficient number to clearly show the rate of decline in numbers of *B. typhosus* or *B. coli*. In the observations on the survival of *B. coli* only one lactose broth tube was used for each dilution tested. Evidently the actual numbers may have been the estimated numbers given or somewhere between this figure and one-tenth of this figure. Although the contamination with *B. coli* was very heavy and considerable irregularities are noticeable in the results in Table III, there is a general parallelism in the rate of reduction of *B. typhosus* and *B. coli* on dry storage.

Another observation on the survival of *B. typhosus* in dry stored oysters was made with some oysters which had been subjected to chlorination. Before chlorination (less than 1.5 p.p.m. of chlorine) the number of *B. typhosus* was 103 per c.c. of liquor and 19 per c.c. of oyster body emulsion. After storage for 8 weeks (refrigerator) 1 c.c. of liquor contained 1.2 typhoid bacilli and 1 c.c. of oyster body emulsion gave 0.19 *B. typhosus*.

These experiments show that *B. typhosus* may persist in oysters for a period of time beyond any time of storage which occurs in the trade.

The death of oysters during the period of storage led naturally to the question as to whether a dead oyster was a favorable culture medium for the typhoid bacillus. Killed contaminated oysters were stored at room and icebox temperature and approximately equal portions of body substance were ground in 2 c.c. of broth and cultured. In oysters contaminated with pure cultures and held at room temperature there was evidence of a slow multiplication approximating 15 times after 7 days, followed by a more rapid rise to approximately 1,000 times after 10 days. At icebox temperature there was a moderate increase to the 7th day, then a slight decrease, the number being approximately the same on the 10th day as on the 1st. In oysters contaminated with stool suspensions, at room temperature the overgrowth of other organisms prevented the isolation of *B. typhosus* by the direct plating method after the 1st day. By enrichment methods *B. typhosus* was recovered up to the 10th day. At icebox temperature *B. typhosus* were isolated up to the 10th day, the last examination made. There was no noticeable increase

during this time. These observations indicate the possibility of recontamination by the drip from dead oysters, which contamination would be greater if the temperature were such as to allow growth.

As was to be expected, other workers were impressed by the occurrence of oyster-borne typhoid fever in inland cities and started to investigate the viability of *B. typhosus* on or in oysters.

Kinyoun reports that oysters heavily contaminated with stock cultures of *B. typhosus* yielded *B. typhosus* up to the 15th day, when the observations were terminated.

Jordan likewise contaminated oysters with culture strains of *B. typhosus* and stored the oysters at 5° to 8° C. He isolated *B. typhosus* from the interior of the oyster up to the 24th day. After this the results were negative and the experiment was terminated on the 30th day.

Tonney and White also contaminated oysters with stock cultures of *B. typhosus*. The contamination was extremely heavy. The results with those stored at 45° F. only are quoted. The oysters were opened in the ordinary way, up to the 17th day, so that the typhoid bacilli isolated up to this day may have been from the shell or from the liquor. After the 22nd day the liquor was collected in a way to avoid contamination of the shell. In the case of dead oysters washings were examined. The results were positive to the 60th day, negative thereafter. The oysters remaining after the 39th day were all dead.

Of the earlier observers, Field working in this laboratory showed the persistence of *B. typhosus* for the longest time, *viz.*, 42 days, when the experiment was terminated.

The question of the rate of cleansing which occurs when contaminated oysters drink in successive changes of sea water has been the subject of earlier investigations. We undertook a reinvestigation of this subject because we felt that the means of isolation of *B. typhosus* at our disposal would possibly demonstrate a longer persistence of *B. typhosus* than was indicated by earlier observations. This has been the case, but the conditions of the experiment were not completely satisfactory for the longevity of the oyster and death of the oysters terminated the observations.

TABLE IV

EFFECT OF CHANGING SEA WATER ON THE NUMBER OF B. TYPHOSUS ON OR IN OYSTERS

Days after contamination	No. of changes of sea water	Estimated number of B. typhosus per c.c. Liquor	Oyster body emulsion	Estimated number of B. typhosus per shell	B. typhosus per c.c. of sea water in tank
0	0	2,675	213	40,400	12,300
1	1	424	68	9,500	550
3	2	64	42	980	800
4	3	2	0.5	75	Neg.[1]
7	6	8.6	0.5	64	Neg.
11[2]	9	4	+<0.1	84	Neg.[2]
15[4]	12	7	1.5	74	0.75
21	16	1	2.2	1.2	0.25
24[5]	18	1.6	2.2	3.7	Neg.

[1] Negative in this column means *B. typhosus* not isolated from 20 c.c. of water.
[2] Positive on the 8th and 10th days, 7th and 8th change.
[3] Still drinking grayish slime developing on shells.
[4] Same condition, one dead oyster found.
[5] Remaining oysters dead, slime increased water had disagreeable odor.

The 50 oysters for this experiment were contaminated with typhoid feces and then placed in 4 gallons of fresh sea water. The water was changed 18 times in a period of 24 days. The temperature in the shed where the tank was kept was from 60° to 70° C. and just prior to each change of water samples were taken for examination. Table IV gives the results of a sufficient number of these observations to indicate the rate of decline in the number of *B. typhosus* present.

The results indicate that 3 successive drinkings in fresh sea water will result in a reduction of about 99 per cent of the typhoid bacilli on or in contaminated oysters. This degree of reduction compares favorably with that which was obtained (see previous number of this JOURNAL) with successive treatments with chlorinated sea water and intermediate drinking. There was a difference however; with simple changes of plain sea water *B. typhosus* were isolated from the tank water almost to the end of the experiment. This continued contamina-

tion was evidently due to the rinse from contaminated oyster shells and the excretion of contaminating *B. typhosus* from within the oysters. With chlorination, however, we usually failed to isolate *B. typhosus* from the tank water. The exceptions were with heavy contamination in which case the chlorine added was unable to destroy all the typhoid bacilli in the tank water.

The failure to keep oysters alive for a sufficient time in the previous experiment was apparently due to eventual fouling of the water and reduced oxidation of the sea water which was stored in barrels. Permits are granted during the closed season for the removal of oysters from condemned beds to uncontaminated waters for cleansing. It was the intent of the above experiment to give some indication in this regard. Although the indication is that even 3 weeks is insufficient, it seemed desirable to repeat this experiment under conditions more favorable to the oysters' activity. As cold weather had supervened this could not be done, but we plan to carry out such an experiment as soon as the natural waters have warmed sufficiently to insure active drinking.

TABLE V

PERSISTENCE OF B. TYPHOSUS IN CONTAMINATED OYSTERS RETURNED TO NATURAL WATERS, 10 OYSTERS EXAMINED AT EACH TEST

No. of days in bay	Date	Temperature of water	Number positive for B. typhosus: Shells	Liquors	Bodies	Pooled Gills[1]
0	12–2	.....	10	10	9	Pos.
1	12–5	Not taken	0	1	3	Pos.
4	12–9	43° F.	0	1	1	Pos.
10	12–14	36° F.	0	1	1	Pos.
17	12–21	41° F.	0	0	1	Neg.
24[2]	12–28[2]	39° F.	0	0	1	Neg.
31[2]	1–4[2]	39° F.	0	0	2	Neg.
39	1–12	30° F.	0	0	0	Neg.
51	1–26	36° F.	0	0	0	Pos.

[1] Gills from the 10 oysters put in brilliant green broth.

[2] Five control oysters (not contaminated but placed in same waters) examined on each date gave negative results.

In the meantime we have investigated the length of time that *B. typhosus* will survive in oysters during the winter months when the oysters are returned to natural waters. The place selected for this experiment was in a bay near a series of condemned oyster beds. The oysters for the experiment were secured from these beds so that the factor of change to different waters might not enter. These oysters were contaminated with typhoid feces. The contamination was comparatively light, 100 *B. typhosus* per shell, 3 per c.c. of liquor and less than 0.4 per c.c. of body emulsion. The oysters were submerged in the bay water in lots in wire crates and then brought to the laboratory at intervals for examination.* The results of these examinations are given in Table V.

The temperature of the water was taken as noted. As a further guide to the probable temperature of the water during the intermediate times we quote the following from the Weather Bureau report:

MEAN DAILY TEMPERATURE (FAHRENHEIT)

December, 1925

1	2	3	4	5	6	7	8	9
38°	43°	44°	48°	50°	50°	43°	40°	36°
10	11	12	13	14	15	16	17	18
30°	32°	41°	40°	32°	31°	32°	32°	31°
19	20	21	22	23	24	25	26	27
34°	41°	40°	37°	28°	32°	32°	20°	10°
28	29	30	31					
23°	28°	26°	26°					

January, 1926

1	2	3	4	5	6	7	8	9
33°	38°	39°	42°	42°	44°	30°	25°	27°
10	11	12	13	14	15	16	17	18
28°	28°	28°	20°	24°	32°	34°	34°	46°
19	20	21	22	23	24	25	26	27
44°	42°	46°	30°	22°	26°	23°	28°	32°
28	29	30	31					
22°	14°	30°	39°					

It is probable from the data given that little drinking took place. These observations indicate therefore that should oysters become contaminated during their more inactive period, *B. typhosus* can persist in them for at least 51 days. It was a surprise to us that we should succeed in isolating *B. typhosus* after this length of time considering how light the initial contamination was. The length of time of persistence was equally surprising as there was no reason to believe that *B. typhosus* would survive for this time even in inactive oysters. On the other hand, the conditions might be con-

* We are indebted to Dr. Rowland G. Freeman for taking care of these details.

sidered as comparable to dry storage because of the inactivity, and *B. typhosus* will persist for this time in dry stored oysters.

It might be argued that the bacilli isolated came from the relatively unsafe waters in which the oysters were placed. This we believe was not the case as shown by the control (uncontaminated) oysters. The numbers of control oysters were small due to accidental loss of some crates through breaking of the tie-ropes. Even so, we believe that the results indicate that the *B. typhosus* isolated were from the artificial contamination.

Some of these oysters were examined for *B. coli*. A score of *zero* was obtained on oysters yielding *B. typhosus*. It has not infrequently been noted in our experiments that *B. coli* colonies were very few in number or apparently absent on plate media which showed the presence of colonies of *B. typhosus*. Such observations emphasize what one tends to forget—a high *B. coli* score is an indication of danger, a low *B. coli* score is not necessarily an index of safety.

In the above work and in that previously reported both the Endo medium and brilliant green agar (Krumwiede) were employed. As was to be expected, the latter frequently yielded positive results, where the former was negative. In addition, a brilliant green broth was used for enrichment. As we knew that the oyster liquor and expecially the oyster body emulsion would reduce the activity of the dye, preliminary tests of this factor were carried out. As it would not be feasible to use several dilutions of dye with each of the many samples so as to strike the optimum in each instance, an average optimum was selected. For culturing the oyster body emulsion 1 c.c. of a 1–1000 solution of brilliant green was added to 50 c.c. of broth. For the liquor, 0.25 c.c. of the dye solution was employed. The washings from the shell were cultured in 50 c.c. of broth to which 0.25 to 0.5 c.c. of dye solution (1–1000) was added, the amount varying with the quantity of dirt washed from the shells. Veal broth of a reaction of pH.7.2 was employed.

The tables have shown how efficient this procedure has been in isolating the residual few *B. typhosus*. The maximum efficiency of the procedure was not reached, however, till the latter half of our work, that is, until we found how successful repeated platings from the enrichment broth might be. To illustrate this we have tabulated the results of a series of successful enrichments according to the day on which positive results were obtained (Table VI). The 40 positive results are those obtained in 82 attempts at enrichment of *B. typhosus* in the last chlorination experiment we carried out. The table shows how the number of positive results increased on each succeeding examination of the broth.

TABLE VI

POSITIVE FINDINGS FROM ENRICHMENT BROTH (40 SAMPLES) ACCORDING TO DAY OF POSITIVE RESULTS

Days of incubation of brilliant green broth	Specimens grouped according to days of positive findings	
1	12+	28—
3	10+	18—
5	10+	8—
7	6+	2—
10[1]		2—

[1] Observations continued until the 21st day but no more samples became positive.

SUMMARY

B. typhosus persisted in shell oysters stored at refrigerator temperatures for as long as the oysters lived, a period of 41 days. The oysters dying after this time were examined on the 49th day of storage and also yielded *B. typhosus*. The *B. typhosus* on the shells of stored oysters were apparently dead after 14 to 40 days, the length of persistence depending on the degree of contamination. A dead oyster serves as a culture medium and the number of *B. typhosus* will increase if the temperature is satisfactory for multiplication. Repeated changes of fresh sea water resulted in a rapid dimi-

nution of the number of *B. typhosus* on or in oysters, the diminution reaching about 99 per cent after 3 changes of water. *B. typhosus* was isolated up to 21 days, during which time the water was changed 16 times, after which the remaining oysters died. The degree of purification following 3 changes of fresh sea water approximated that observed with a similar number of treatments of chlorinated sea water. There is a difference, however; in most instances the *B. typhosus* in the chlorinated water was apparently killed. Contaminated oysters were placed in natural waters the temperature of which was low enough to largely inhibit drinking. The oysters contained *B. typhosus* after 51 days in these waters, the last observation made. In some of these experiments as well as in some of those described in our previous report, note should be made of the prolonged persistence of minimal numbers of *B. typhosus* under different conditions. This prolonged persistence emphasizes the fact that apparently the only safe oyster is one which has been protected from any contamination with fecal pathogens for at least some months prior to harvesting. The actual time can only be determined by further careful experiments.

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SOURCES OF MATERIAL*

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HERE ARE a few samples of questions which public school teachers are likely to ask:

"Where can I find motion pictures about health?" "Who gets out rhymes, songs and games about the care of teeth?" "Where can I obtain a simple and readable book about nutrition for use in school work?"

The purpose of this paper is to start discussion of the problem confronting teachers of health in finding out what teaching material there is, and where and how it can be secured. As revealed in the summaries of the Chicago Health Education Conference,[1] the materials needed by the teacher are of many kinds. They include information about teaching methods; material for the children to look at, and use; and information for the parents. The itinerant teacher, the school nurse or other teacher who comes into a class room at weekly or other periodic intervals, also needs to know the sources of supply for the books, pamphlets, motion pictures, posters, slides, suit case theaters and other materials used in getting children interested in health.

My own interest in this problem is chiefly of two kinds. In the first place, I am one of those who frequently receive requests for material which, because of mistakes in reference lists, I am supposed to have; and in the second place, I am interested in the whole problem of making

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Although this paper is written in terms of the teacher and the school the discussion applies generally to the making and using of source lists.

health information easy to obtain. The specific problem for the present discussion is how to prepare reference lists which will tell clearly and accurately what material there is and where to get it.

There is an increasing number of reference lists on health education of many types and from many sources. One of the newest indoor sports is making source lists for the teacher of health and hygiene. In fact, her real difficulty arises after she has encountered the available lists and discovered what appears to be an overwhelming mass of material. She must somehow get the materials from libraries or by correspondence; and go over it to learn whether or not it meets her needs. It is extremely important therefore that the reference lists supplied to her should be correct, informing and suggestive.

The observations I am about to make on the available source lists are based on the study of many lists issued by health organizations, and in particular on a recent test made in connection with several of the more important lists. I have attempted to see the problem from the standpoint of the teacher. About 75 teachers were asked questions about their problems in using lists, and requests for material were sent by a young woman living outside of New York City to a number of organizations named on reference lists.

From these observations it appears that the chief difficulties in using reference lists now in existence are:

1. Loss of time in writing for material through wrong or inadequate information about the sources named in the list
2. Need for more help in selecting materials from the references given

ERRORS AND OMISSIONS

Wrong addresses, lack of local addresses, incorrect organization names and incorrect publication names frequently occur. Many errors were found in the names of organizations. American frequently becomes National. Russell is left off Russell Sage Foundation. National is omitted when it is an important part of the name. The wrong cities are named in addresses of organizations and periodicals.

Frequently no street address is given. In these cases it depends upon the ingenuity and knowledge of the tracers in the post office who try to add the street addresses to letters before they can be handled by carriers. Dr. Thomas Wood, National Council, National Education Association, New York City, was on one list. Mail so addressed was not delivered to him. Among wrong or obsolete addresses given on a recently published list were: "Camp Fire Girls, 461 Fourth Avenue" (an address never used by the Camp Fire Girls); "Association Press, 128 East 28th Street" (a before the World War address); and "Russell Sage Foundation, 1 Madison Avenue" (more than 10 years out of date). "Department of Health, Boston," was intended to refer to the Massachusetts State Department of Health. The omissions mean, at least, that letters must be passed from one part of the city to another.

How can the teacher locate book publishers since most lists do not name even the cities where publishers are located, or do not do so for all books, frequently omitting the city of the lesser known publishers?

Condensed names of publishers add to the complications for any who are not thoroughly familiar with the names of publishers. For example: Dodd, Mead and Company may be condensed to simply Dodd.

Every library and every book seller could have that information easily accessible, but unfortunately many of them do not. Of course, both libraries and book sellers may readily find all needed information as to publishers and prices; but some book sellers in smaller communities are not very much on the job when it comes to getting information not right at hand, and every time it is necessary for

a teacher to go to someone else to get information before actually securing a book or other materials it adds that much to the burden and reduces the number of teachers who will follow through.

How will the teacher locate the addresses of periodicals so often mentioned in reading lists of all types without the publication addresses?

The one inclusive list of which I know is *Ayer's American Newspaper Annual*,[2] but it is doubtful whether the majority of school and public libraries have this book. The teacher probably does not know how much more frequently this directory will be found in newspaper offices or the office of advertisers. Of course, it is easy to locate the strictly educational periodicals if one has the *Educational Directory*[3] of the Bureau of Education.

Lists are possibly used most among teachers in smaller cities, towns and rural sections where help from book stores and libraries is hardest to get.

MISTAKES IN LISTING MATERIAL

"The Committee on Foods and Nutrition[4] of the National Research Council" is mentioned in 3 lists as one of the organizations that issue health literature, charts, etc. In response to a request, the council replied, "the Committee has no material of this kind for distribution." The repetition of this same error several times suggests that lists are copied without being checked up. Several other organizations denied having material of the sort that they were listed as supplying, and several state health and education departments did not know of pamphlets credited to them by specific titles.

"Report of the Russell Sage Foundation on open air schools" *probably* refers to a book by Ayres once published by Doubleday Page Company, but no longer issued by them.

Out of one list of 49 organizations 8 did not reply; one replied saying it had no health information; 3 letters were returned because no street addresses were given; and 2 because the wrong city was given on the list. Five wrote back asking for further information.

Four New York City addresses were grouped together under one of the inclusive headings so common in lists. They were these: "Knights of Columbus, 105 West 40th Street," "Y.M.C.A., 124 East 28th Street," "Y.M.H.A., Lexington Avenue and 92nd Street," and "Y.W.H.A., 31 West 110th Street."

One of these was the address of the International Committee, Y.M.C.A., before the World War. The others are addresses of local branches of national organizations. In time letters reached two of the national organizations. Neither had any health education material, and one pathetically asked for information as to who was responsible for the many requests which were coming to them. The third agency replied that they had no health material—except a series of health talks! But to make sure about the reference a second letter asked if anything had been issued in earlier years. The executive stated that she had been with the organization for over 8 years in which time no health material had been published.

The danger in listing ephemeral material was emphasized by replies from several correspondents stating that copies were no longer available. This applies particularly to educational material issued by commercial concerns.

Incidentally, one may well question the fairness to advertisers of the practice of encouraging children to write for advertising material merely that pictures may be cut from it.

Some of the trails of information opened by the lists at least lead into unexpected byways. One letter brought as "*health material*" a copy of "Regulations Governing Sausage Factories and Establishments Used for Smoking and Preserving Meats." One national agency sent 6 pamphlets including several on home laundering, house cleaning, and removal of stains from textiles. Another

sent posters and placards, but enclosed no list or reminder of its especially valuable pamphlets on health education.

Probably the reference list makers are not responsible for the fact that many of those given as references did not reply to letters. Seven of 11 sources given for motion pictures on health education responded to our letters, and 9 of 14 asked for other material replied.

The writer is familiar with many of the pitfalls that beset the maker of lists and is not unappreciative of the investment of time and care necessary to make references correct and informing. In the preparation of a *Reading List on Publicity Methods* every reference was submitted at least twice to the publishers of books and periodicals, in some cases three times. In at least 2 cases quite different facts were offered on the 2 submissions by the same publisher. Even with this double or triple checking 2 errors in the list have been discovered to date.

However, if you are issuing a list, you can and should at the very least submit every item to the source named unless you have current assurance that the address is up-to-date and that the material will be available during the period the list may reasonably be expected to serve.

HELP IN SELECTING MATERIAL

A reference list should be reliable; but it is even more important that it should be helpful. Yet the published lists are somewhat indiscriminate and inclusive; they fail to indicate which are source materials for teacher, which publications include method, and which are for the use of children. The teacher needs something more than a catalog of sources under the broad classifications of posters, slides and motion pictures on health education, or pamphlets on the teeth or books on diet. She needs enough information on each item listed to help her to make a selection. For example, in one list, under "Tuberculosis" is named the "American Review of Tuberculosis" with nothing to tell the uninitiated that this is a highly technical periodical for physicians.

Again, under "Nutrition" with subheads like "Classification of Foods, Cereals, Vitamines, Mastication, Elimination, Water, etc.," the list of periodicals includes "The Family," the organ of the American Association for Organizing Family Social Work. In the course of a year there may be several articles in this magazine on family budgets or on nutrition values in relation to family problems, but the chances are equal that no given number may contain anything of the sort. It would be better to suggest specific articles.

Incidentally, list makers may lessen the need for extensive references to periodicals for use in communities having school or public libraries by introducing teachers to *The Readers Guide to Periodical Literature*[5] and to *Public Affairs Information Service*[6]—and by urging that school libraries secure these invaluable source lists on all class room topics.

IS THE MATERIAL FREE?

The failure to state prices adds to the labor of the teacher who may wish to purchase a book on a given subject. In a group of titles on a certain subject there may well be one of merit and suited to the teacher's need which is much less expensive than the others. Price references would facilitate the selection of that book.

To only a limited extent do any of the lists give a clear indication as to whether or not specific books, pamphlets, posters, slides, motion pictures, etc., are to be had *free*. The teacher, who as a rule has limited time and money, may write many letters to learn whether or not she may reasonably expect to secure certain of the listed items.

Again, few reference lists explain that certain material is available only within a limited territory. The Philadelphia Inter-State Dairy Council, for example, does not supply its material to places even so near as New York State.

WHAT TEACHERS SAY

Here are a few replies from teachers who were asked what difficulties, if any, they experienced in making selections from published reading lists or lists of sources for securing material:

"Knowing whether or not that particular material was fitted to your work."

"Too general usually, and not enough to the point."

"Great difficulty in finding out which materials are based on sound scientific knowledge and which are 'short cuts to happiness.'"

"Book lists do not state what certain things are stressed in various books."

ENDORSEMENT OR RECOMMENDATION

Probably the greatest help to the person in the field would be a recommendation or endorsement of material carefully passed upon for the soundness of its information and its value as teaching material. Teachers would be very glad to secure not merely *lists* but *approved lists*.

Such an approved list would not apply to sources of material, but to specific pamphlets, posters or books. Unless a qualified endorsement is given the teachers who secure material from one source will have nothing to suggest that everything coming from that source is not equally desirable.

Certain poster material put out by one agency is very much liked by those who have considered some of the points to be reckoned with, while other items from the same source are mediocre, or are distinctly undesirable.

The fact that items are included on a list may be taken as approval of it, whether or not it is intended to be. In this connection let me urge that before list makers suggest that teachers use commercial advertising material, or so-called "educational" material, brought out by tooth paste, food and other commercial concerns, they should think it over very carefully to be sure that they may not thus help to spread unsound teachings or at least biased information.

One way to select approved material for lists is to hold "clinics" on materials at local, state and national institutes and conventions. Here specific materials can be criticised by leaders—with plenty of participation by the audience. Such discussions may well be preceded by setting up a few tentative standards. Of course such standards and such discussions would not be final and there would certainly be errors of judgment, but the discussion would lead toward the kind of thinking and judging which needs to be done not alone by the makers of lists but also by every teacher who uses lists or who gets her materials from many sources.

Exhibits of selected materials may be made at conventions and institutes—provided that those who make the selection will at least ask this question: "Do we believe that this material will be of actual, working help to the average teacher who will see it?"

HOW TO ASK FOR MATERIAL

Every list, if it is at all possible to spare the space, might well be introduced with a few suggestions to teachers on how to ask for the suggested materials.

In most cases the letters should mention that the writer is a teacher, principal, superintendent, or city supervisor. If the writer is a child the letter may well carry an explanation that the material requested is to be used in a certain school or class. Letters from individual children, judged by the handwriting, are ignored in some offices.

Never should requests be written on a post card.

Usually it will be well to mention the source of the information, *partly* for the satisfaction of the one to whom the teacher is writing and *partly* because the mention of the source will often make easier the work of the one who replies to the letter.

When there is a general heading to a list, as in the case of so many of them, it may simplify matters if that statement is quoted in the letter.

To the above we may add these tentative ideas as to the sort of suggestions to be given to those who use lists:

1. By all means when material is requested for a particular time the date should be given. Very seldom does anyone mention the date of the fair or the meeting for which slides, exhibits or motion pictures are wanted. Mention of the date in all such instances frequently settles a number of questions for the one who answers the letters.

2. If inquirers would mention that they have money to spend—or have none—it would also lessen the work of those who answer letters.

Lastly, if we who use lists, teachers or others, will write to the compilers and to the publishers of school books, and other books, courses of study and periodicals which offer lists, telling them of errors or of difficulties created by them, we may hasten that glad day when it will be simple and easy to secure what we need when we need it.

NOTE: The most satisfactory lists of materials and services offered by organizations for use by teachers, known to the writer, are included in two reports of the former National Child Health Council:

The Campaign Against Malnutrition. 1923. Superintendent of Documents, Washington, D. C. 10 cents.

Health for School Children. 1923. Superintendent of Documents, Washington, D. C. 10 cents.

A good feature of a source list is the mention of topics of particular interest under the titles of the more important books, together with the page numbers on which these topics appear. For examples see

Health Education—Syllabus in Hygiene for Kindergarten and First Six Elementary Grades. University of the State of New York Bulletin, Albany, Dec. 15, 1921. Free in New York State. 20 cents elsewhere. Most state libraries and state superintendents of instruction have copies.

This device would be particularly helpful to the teacher in determining the probable usefulness of individual books which may be mentioned in the text or referred to in footnotes. The user of the list would appreciate having these same references also brought together under the book title in the comprehensive reading list which is likely to be included in the back of the publication.

REFERENCES

1. A full report of the 1925 Health Education Conference will be issued early in 1926 by the American Child Health Association, 370 Seventh Avenue, New York.

2. N. Y. Ayer and Co., Philadelphia. $15.00.

3. Superintendent of Documents, Washington. 15 cents.

4. Probably an inaccurate reference to the Advisory Committee on Food and Nutrition of the National Child Health Council. This committee prepared "The Campaign Against Malnutrition."

5. 958 University Ave., New York City.

6. 11 West 40th St., New York City.

Enterprising Fathers—A group of fathers, whose wives and children attend the Infant Welfare Center, Kensington, have been organized since 1921 as a Fathers' Council. This council works in coöperation with the general committee of the center. Their expressed purposes are:

1. To bring home to fathers the responsibilities that rest upon them in giving the child a proper start in life.

2. To advance the interests of the center.

3. To raise funds for the center by means of entertainments, etc.

The council aids in eradicating unsanitary conditions and housing violations in the district, and assists in the formation of such councils in other parts of London. In the future a part of each meeting is to be devoted to a health talk and discussion.—*Maternity and Child Welfare, London*, Dec., 1925.

Universalizing Breast Feeding in a Community—F. H. Richardson, M.D., states these points essential in a breast feeding program:

1. A group of physicians who believe firmly in the superiority of breast feeding, who believe it possible of attainment in most cases, and who are familiar with a working technique for maintaining or increasing breast milk.

2. Coöperation of the birth registration department of the community.

3. A nursing organization with nurses trained in breast feeding technique who will visit each new mother and teach her the need of breast feeding and the means of accomplishing it.

Nassau County, New York, was the first to undertake a breast feeding campaign in a large way. The infant mortality rate during the year of the campaign was 64 per 1,000 as against 72 in the preceding 3 years.—*Jour. A. M. A.*, Aug. 29, 1925.

AN OCCUPATIONAL SYNDROME AMONG WORKERS IN ZINC*

CAREY P. McCORD, M.D., FELLOW A.P.H.A., AND ALFRED FRIEDLANDER, M.D.

Industrial Health Conservancy Laboratories; and University of Cincinnati, Cincinnati, O.

IN THE galvanizing room of a sheet metal plant under our medical supervision, the incidence of gastrointestinal diseases during the past 3 years has been exceptionally high. In the early part of 1925, the demonstration of gastric ulcers in one of these workers led to an inquiry as to the nature and cause of this condition among these galvanizers.

Of the 20 men engaged in this work, 15 had been employed over a long period of years (6 to 22). Twelve of these 15 exhibited characteristics of severe gastrointestinal inflammation culminating, in a few instances, in well established gastric or duodenal ulcers.

The outstanding features of the series of 12 cases are:

A. Marked anemia, pallor
B. Gastrointestinal manifestations of a character commonly associated with ulcer or pre-ulcer conditions
C. Constipation—abdominal distress more marked when constipated
D. Persistent headache

Although not more than 20 men have been employed at any one time, a larger number of workers have been observed, owing to the labor turnover. In no worker whose employment period has been less than 5 years has there been any complaint approximating the severity described above. A few have complained of fleeting gastritis, hyperacidity, etc. The men of the group under observation as a rule have been drinkers, of low intelligence, excessive users of tobacco, having bad eating habits, and the majority presented bad mouth conditions. Economic conditions have also caused worries and stress. With few exceptions, all of these workers are related either by blood or marriage. Many have failed to coöperate with us and it has been impossible to carry out valuable diagnostic tests; gastric analyses have been out of the question. In some instances X-ray examination, urinalyses or blood counts have been unobtainable.

This low type of worker is found in other departments in this plant, and in other plants under our observation. Among the 200 other workers in the plant only 1 case of gastric ulcer has been detected in the course of the 3 years of our work. In view of the high incidence limited to this small group of galvanizers, and in view of the appearance of the disease only among long time workers, we suspected the work processes of being the possible causative agent.

TRADE PROCESSES INVOLVED IN GALVANIZING

In the quest for the cause of this occupational disease, investigations were carried out in two plants. In plant 1 these cases have been detected. In plant 2 no cases of this occupational disease have been found, but acute zinc poisoning is known to have occurred. In plant 2 no workers except foremen have been engaged for as long a period as 6 years.

"Galvanizing" is the term designating the coating of iron or steel with zinc.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 21, 1925.

The first step is to prepare the material to be galvanized so as to present a clean metal surface, in order that it can "take" the coat of zinc. The cleansing with acids of iron from adhering rust, scale, or other foreign substances is known as "pickling." There are several acids that may be used—sulphuric, hydrochloric, and hydrofluoric acids. Sulphuric acid is the agent most commonly employed.

In Plant 1 the various tubs, buckets, cans, etc., to be galvanized are made from sheet iron. These sheet metal objects are placed in a large vat containing water and sulphuric acid. A gross rule of thumb governs the concentration and temperature to be maintained. A solution of 7.5 per cent acid and a temperature of 150° F. probably represents optimum conditions. The sulphuric acid in this weak solution is not freely volatile, but steam arising from the vat readily carries the sulphuric acid. Also, into this pickling bath is placed an unmeasured quantity of a preparation having the trade name of "Klean-rite." An analysis of this proves it to be 98 per cent sodium chloride and 2 per cent organic material. In the pickling process large volumes of hydrogen are evolved. White[1] points out that as much as 1.05 c.c. of hydrogen may be set free from every square inch of iron metal following pickling. This liberated hydrogen is capable of combining with the sulphur present as an impurity, and with the arsenic found as an impurity in zinc.

Some sulphuric acid used in pickling is reported as containing admixed nitric acid. In a few galvanizing plants such chemicals are added as will lead to the production of hydrofluoric acid. We believe that neither of these hazards need be contemplated in this investigation. After pickling, the sheet iron objects are sometimes immediately submerged in molten zinc, but at other times are rinsed in dilute hydrochloric acid solution at room temperature. Some galvanizing plants allow for drying before submerging in molten zinc; others rinse in plain water, but in Plant 1 the object is submerged wet from the dilute acid.

The zinc chamber is roughly 4′ x 8′ x 3′ in depth. Heating is obtained through the use of city gas, which is known to contain a small percentage of carbon monoxide. A flue for oven fumes extends above the level of the workers' heads, emptying into a larger hood placed over the entire zinc chamber. The molten zinc is kept at a temperature of 468° C. The surface of the molten zinc is divided into two parts by a partition. Upon the surface of one part there is superimposed a layer of salammoniac that serves as a flux. In addition to ammonium chloride used in this step, admixed zinc chloride is often used. Mixed with the salammoniac are small quantities of "cereal middlings" to fluff it up. From time to time during the day, there is placed into the molten zinc small bars of a commercial combination of metals called "silver metal." This serves as a brightener for the galvanized surface. This contains aluminum, antimony and tin. Several workers stand directly over the molten zinc. These workers are engaged in submerging and lifting out articles to be galvanized. The work is at a high temperature at all seasons. The galvanized articles are allowed to drip free of molten metal and after a very few minutes are removed for stripping of adhering particles and for storage.

The foregoing processes for galvanizing hold true in a general way for all plants galvanizing small articles—cans, tubs, and such utensils.

In Plant 2, the galvanizing is limited to flat sheets of metal. All sheets are of the same size and essentially all processes are carried out by machinery. Instead of recounting in detail the trade processes involved, only those items will be mentioned which differ from those described above. In the latter plant, after pickling by machine dipping, all sheet metal is redipped in lime water to neutralize the effects of the acid. Although vapors arise visibly from both of these kinds of vats,

there is no obvious mingling of fumes until they are far above the breathing level of workers. These vats are some distance away from the molten zinc vat where again no intermingling of fumes is noticeable at low levels. Prior to submersion in molten zinc a dipping is made into ordinary water. It is believable, therefore, that no gross formation of zinc chloride or zinc sulphate takes place at this point. Other differences of lesser import have been noted, such as the use of tallow as the fluffing agent instead of middlings, and the blowing of sulphur dioxide fumes over the surface of the molten zinc.

PLANT 1

1. The workroom is small, with low (12 ft.) ceiling and visible mingling of fumes.
2. The pickling and galvanizing vats are placed relatively close together, favoring the admixture of fumes.
3. All work is done by hand with men in close proximity to chemicals employed.
4. Pickled objects, wet with acid, are submerged directly in molten zinc through flux of salammoniac.
5. Majority of workers employed in excess of 6 years.
6. "Silver metal" used.

PLANT 2

1. The workroom is very large with the ceiling 65 feet above ground level, with mingling of fumes only at high levels.
2. Vats for pickling and galvanizing are at a greater distance.
3. All work is done by machinery with men kept at considerable distance.
4. Pickled objects are submerged in lime water to neutralize the acid, and later into tap water prior to submerging in molten zinc through flux of salammoniac.
5. Practically all workers employed less than 6 years.
6. "Silver metal" not used.

It has already been noted that in Plant 2 no cases of the occupational disease under study have arisen. It is believable from analyses made that the same impurities of crude materials are common to each plant. The type of workmen is similar although no old timers are found in Plant 2, owing to past labor difficulties. The above differences in the processes involved may serve to explain the difference in health conditions.

ANALYSES OF MATERIALS AND DUSTS *

Since in our opinion exposure over long periods of time is necessary to develop the condition being studied, not a great deal of information is to be gained from analyses of materials used at this immediate time. Materials in use in the course of 20 years have been obtained from different sources, made by different processes, without doubt containing varying quantities of impurities. Analyses have been made on some materials; in other instances acceptable recorded analyses have been utilized. It is our purpose in recording these analyses to indicate the general character of impurities contained therein.

The sheet iron, later to be galvanized, presented the following impurities: carbon, manganese, sulphur and phosphorus. The quantity of these impurities varies. According to White [1] the percentage is approximately: carbon, .13 per cent; manganese, .38 per cent; sulphur, .045 per cent; phosphorus, .065.

The salammoniac tested 98 per cent ammonium chloride.

Analyses of spelter, by Ingalls,[2] are accepted by us as representing the average spelter in use. One analysis is here cited, showing the impurities mixed in with the zinc.

Pb%	Fe%	Cd%	As%	Sb%
0.0701	0.7173	.....	0.0603	0.0249
Cu%	Bi%	SiO%	S%	C%
0.1123	.....	0.0346	0.0035	0.1775

The sulphuric acid in current use tested 76.9 per cent. Traces of lead were found and negligible traces of unrelated impurities were detected.

*A portion of the analytical investigation was conducted by The Langdon-Meyer Laboratories, Cincinnati, Ohio.

Analyses of dust settlings taken from ledges near the galvanizing vat in Plant 1 were made on several occasions, of which two are cited:

PLANT 1

Qualitative Analysis

A sample of the dust settling above the galvanizing pot and representing probably the condensable portion of the fumes to which the operator is subject, shows a trace of antimony, much zinc, iron, sulphides, sulphates, chlorides, as well as some material insoluble in strong boiling acids.

Quantitative Analysis

Sulphur as sulphates (SO_3)	14.20%
Iron and aluminum oxids	8.92%
Zinc as Zn	35.00%
Ammonia as NH_4	6.25%
Chlorides, Cl_2	18.50%
Sulphur as sulphide	.08%
Silica, SiO_2	1.05%
Calcium	Traces
Arsenic	Doubtful traces

In Plant 2, a specimen of ledge dust was taken at a level of about 45 feet above the heads of the workers. An analysis exhibits constituents as follows:

PLANT 2

Quantitative Analysis

Sulphur as sulphates (SO_3)	17.29%
Iron and aluminum oxides	6.65%
Zinc as Zn	45.6 %
Ammonia as NH_4	10.35%
Chlorides as Cl_2	13.36%
Hydrogen sulphide	.06%
Lead	Traces
Tin	Traces
Water soluble material	55.32%
Antimony	0
Arsenic	0

A qualitative analysis of "spelter dross" revealed zinc, iron and aluminum, together with doubtful traces of arsenic.

In the galvanizing room of Plant 1, zinc oxide comes into contact with sulphuric acid in the presence of moisture. The combination of these two substances leading to the formation of zinc sulphate is regarded by us as a certainty. Similarly, the combination of zinc with hydrochloric acid leads to the formation of zinc chloride. One of the consulting chemists aiding us on this point sought to determine the precise amount of these zinc salts through methods based on measurement of total amount of molecular material available for combination. The figures indicate the presence of zinc sulphate in the ledge dusts of Plant 1 to the extent of 15 per cent, and zinc sulphide to the extent of .72 per cent. Other chemists accept with certainty the presence of zinc sulphate, zinc chloride and zinc sulphide, but recommend the avoidance of fixing any precise percentage.

In Plant 2 another possible source of zinc sulphate is in the combination of the zinc with the products of burned sulphur when the latter is used as a displacer of air from the machine rollers. An additional source of zinc chloride is found when salammoniac is used on the surface of the zinc vat. Thorpe [3] attests to the formation of zinc chloride under the conditions mentioned.

From these various analyses, recognition must be given to a number of potentially harmful substances, such as: hydrogen sulphide, arseniureted hydrogen, arsenic, mineral acids, ammonia, ammonium chloride, lead, antimony, cadmium, aluminum, tin and zinc.

We are disposed to regard the salts of zinc, accidentally formed under the conditions just described, as possible causative factors in bringing about the lesions of our cases. We are influenced in this concept by the results obtained in experimental work following the administration of pure metallic zinc and zinc salts. In galvanizing, the zinc hazard has heretofore largely been attributed to zinc oxide, which substance is known to bring about acute zinc poisoning characterized by chills. In order to produce zinc chills, the zinc oxide must have been recently burned and, according to Drinker,[4] the zinc oxide must be in the physico-chemical state of dispersion rather than the state of flocculation. Reference is made to Drinker's excellent paper for a critical review of the literature of zinc oxide toxicology. We have no reason to believe that there is any relation between acute zinc poisoning and the chronic condition described by us. Any toxic properties of zinc resulting in chronic industrial disease has heretofore been largely denied. It is generally admitted, however, that workers in zinc often present chronic industrial diseases. These conditions are usually blamed on antimony, arsenic, or lead, which are

found in these processes as impurities either in the zinc or in the substances used in conjunction with zinc, such as sulphuric acid. The characteristics of these occupational diseases (lead, arsenic and antimony) are fairly well known. However, upon close examination of workers in zinc the manifestations of their diseases do not convincingly coincide with these known characteristics.

THE GENERAL TOXICOLOGY OF ZINC

Zinc may be found in various human tissues and excreta as a result of eating foods containing zinc. Shellfish are known to normally contain zinc, according to Bodansky.[5] Van Itallie,[6] in discussing the normal content of zinc, arsenic, and copper in the human body reports the finding of appreciable quantities in the liver of 24 subjects. Ghigliotto[7] examined the organs of 22 persons dead of accidents. The zinc content (as Zno) varied from .0015 to .0028 per cent of the viscera. Zinc was also found in the fetus.

Rost[8] has found among non-industrial workers the presence of zinc in urine and feces. The average daily excretion in the urine ranges from .6 to 1.6 mg. (as zinc oxide), and in the feces varied from 9 mg. to as high as 39 mg. The source of the zinc is to be found in galvanized pipes, cooking vessels, cosmetics, etc. Salkowski[9] tested plum marmalade made in a zinc-lined vessel and a zinc content of 3.4 per cent was found, estimated as the sulphate. Peterson, Haines and Webster[10] point out that milk, vinegar, soup, olive oil, etc., may be contaminated with zinc from storage in zinc containers. Some zinc is found in practically all foods. The zinc content in samples of beef, veal, pork, and mutton ranged from 26 to 50 mg. per kg.; in beef liver a maximum of 83 mg. per kg. was found; in bread from 5 to 8 mg.; in dried vegetables 6.13 mg. and in cow's milk 3.9 mg.[8] Giaya[11] examined 8 human subjects ranging from the unborn to 70 years. In all of these, zinc was found. The amount increased in proportion to the age. His findings convinced him that zinc toxicity is lacking when stored zinc is less than .05 g. per kg. of viscera. From the foregoing, it is obvious that the qualitative detection of zinc in human organs or excreta may be without significance. In man the zinc content in mg. per kg. of tissue was found by Rost[8] to be: liver, 52 to 146; musculature, 47 to 52; brain, 11. Zinc workers excrete zinc long after they discontinue work in zinc industries. Rost believes that zinc may be absorbed through the intestinal tract, stored in the liver and muscles, excreted in the urine, feces and milk. Salant, Rieger and Treuthardt[12] find that zinc is stored in considerable quantities in the liver.

These data establish the storage of zinc in the human body, thus militating against the theory that zinc is harmless because it is not stored.

Mallory[13] has recently reported the causing of nephritis in animals due to the action of metallic zinc implanted subcutaneously. Schwartze and Alsberg[14] investigated zinc sulphate as an emetic. In the course of this work intravenous injections of zinc sulphate brought about a gastric and intestinal inflammation. Salant[15] after feeding rats weighing from 150 to 200 g., 10 to 15 mg. of zinc acetate daily for 4 months, observed no impairments, with the possible exception of renal disturbance. Sacher[16] reported that zinc-fed rabbits developed albuminuria, renal congestion, gastric petechial hemorrhage. Brandl and Scherpe[17] fed zinc to animals and observed on autopsy, hemorrhage into the gastric mucosa, renal congestion and cloudy swelling. Salant and Wise[18] introduced small quantities of zinc (10 mg. per kg. of animal weight) directly into the circulation and noted marked injury to the kidneys, nephritis, glycosuria, leading to death in a few days.

Wherry[19] injected intravenously zinc acetate in dilutions of 1/20,000 of rabbit body weight. No manifestations devel-

oped in this experiment until the third day when the animal was found dead. A dilution of 1/32,000 per body weight was non-fatal. A higher concentration than 1/20,000 caused immediate death, or death within a short time. In the one case where death followed 1/20,000 dilution, there was observed on post-mortem marked edema of the lungs, a sero-hemorrhagic exudate into the peritoneal cavity, marked nephritis, swollen, gray kidneys with petechial hemorrhage. The stomach was not examined.

Application of zinc as treatment for cancer, particularly of the uterus, has led to absorption and systemic poisoning.

A skin disease attributed to zinc oxide powders has been found among workers in that chemical, by Turner.[20] McCord and Kilker [21] have described ulcers on the extremities of workers in a wood preservation plant wherein zinc chloride was used as a fungicide.

Witthaus [22] enumerates 59 deaths from the effects of zinc chloride, and 29 from zinc sulphate. In all of these the zinc salt was taken in error, or for suicidal or homicidal purposes. Both the immediate and late results center about the corrosive or irritant action on the intestinal tract. The lethal dose is not known because of the emetic action of these salts leading regularly to loss of at least part of the substance. The smallest known quantity of the sulphate causing death was 15.5 g.

Blyth [23] records the developments in a patient who died 14 weeks after taking a tablespoonful of "Burnett's fluid," an aqueous solution of zinc chloride.

In discussing sulphate of zinc, Blyth states, "The infrequency of fatal results is due not to any inactivity of the salt but rather to its almost always being expelled by vomiting."

This review of the toxicology of zinc is not offered as a complete one. Sufficient is here included to convince that this metal has a greater toxicity than is commonly recognized by either zinc industrialists or physicians.

SUMMARY

In a small galvanizing plant, we have detected widespread gastrointestinal conditions, varying from gastroenteritis, in the younger workers, to well-established gastric and duodenal ulcers among workers employed for a long time. Twelve out of 15 workers employed 6 years or longer have presented severe gastrointestinal lesions.

In a second plant, wherein all employes are new at this work (less than 6 years) and wherein the general work conditions are better and exposure to trade process fumes is much less, no cases of this gastrointestinal disease have been found.

We have shown the accidental formation of zinc sulphate and zinc chloride at levels and under conditions that involve exposure on the part of workers in Plant 1.

In workers whose urine has been tested, zinc has been found in quantities in excess of accidental urine content from food, galvanized iron pipes, etc.

These patients have not presented the characteristics of other occupational disease hazards attending galvanizing.

We have sought to stress the occurrence of multiple hazards in the galvanizing industry. On this account we feel unwarranted in drawing any precise conclusions as to the etiologic factor in these cases. Although we attach significance to zinc as a causative agent, we accept various other substances as possible contributing factors. We also believe that the unhygienic condition of the work place, together with the physical type of worker, favor the occurrence of the conditions described.

A close resemblance is seen between our observations of lesions among zinc workers and the findings in the literature referred to wherein study has followed the administration of single, chemically pure substances. Our concept that zinc is capable of producing chronic systemic poisoning is aided (a) by the work of Mallory in obtaining kidney lesions from pure metallic zinc implanted subcuta-

neously, thus disproving the oft-repeated statement that metallic zinc is non-poisonous; (b) by the work of several authors establishing stored zinc in appreciable quantities in various organs and tissues and in excreta of zinc workers, long after the discontinuance of zinc work; (c) by the creation of alimentary tract lesions by pure zinc salts administered intravenously and by mouth.

A long period of time expressed in years (5 to 20) appears necessary for the production of the lesions described.

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Connecticut Public Health Association—The Connecticut Public Health Association held its second meeting for the season at the Welfare Building at Bridgeport, Connecticut, on February 11 with Professor Winslow in the chair. At the morning session Dr. W. H. Coon discussed scarlet fever as an atypical disease, and Professor F. B. Blake of the Yale School of Medicine gave an address on scarlet fever in which he described in detail the prevalence of the disease in its toxemic and septic phases, and described exactly what may or may not be expected from the scarlet fever serum in treatment and prevention.

After a luncheon at which the Association was entertained by Dr. Coon and his associates of the Bridgeport Health Department, Dr. Haven Emerson of Columbia University spoke on the preventable diseases of adult life, and on the basis of a detailed statistical analysis demonstrated the diversity of the behavior of these diseases and the importance of studying each one as an entity by itself, pointing out that the generic term "degenerative disease" is as misleading as the term "zymotic diseases" of the past.

New Rules for the Painting Trades—Announcement is made by the Massachusetts State Department of Labor and Industries that new rules for those in the painting business have been adopted and became effective Jan. 1, 1926. These regulations concern general safety provisions; requirement for registration; general health requirements especially intended to provide protection for workmen using spray coating apparatus. Operators of such apparatus shall be provided with respirators or other effective devices, and exposed parts of the body shall be anointed with a harmless non-drying oil, grease or cream. Dr. Wade Wright served as chairman of the special committee which assisted the Massachusetts Department of Labor and Industries in preparing the new rules.—Mass. Dept. of Labor and Industries, Boston, Mass.

STANDARD FORMS FOR ANNUAL REPORTS OF VISITING NURSE ASSOCIATIONS*

Before submitting the preliminary report prepared by the Committee on Standard Forms for Annual Reports of Visiting Nurse Associations, it seems to me that a brief history of how this committee was organized is in order.

At the last meeting of the American Public Health Association, a letter to the chairman of the Public Health Nursing Section was presented, which is so pertinent to our discussion that portions of it might well be brought out here. The writer of the letter believed that it was of the utmost importance for the development of public health nursing in the United States that the annual reports of public health nursing organizations should be drawn up on some reasonably uniform plan. It was felt that such a plan should eventually have the approval of the National Organization for Public Health Nursing, but because of the need for help from statistical authorities and the value of support from public health administrators, the Public Health Nursing Section of the A.P.H.A. with the assistance of the Vital Statistics Section seemed the logical body to attack this problem.

While this letter came from one visiting nurse organization, others followed with a hearty endorsement of the plan. It was agreed that the work already done by the N.O.P.H.N. on its visiting nurse study would be of inestimable value to the committee. It was finally recommended that any committee appointed to consider the question of a standard form for annual reports should include representation from the N.O.P.H.N.

It was, therefore, proposed that this committee should consist of 6 members: 2 from the National Organization for Public Health Nursing and 2 each from the Vital Statistics Section and the Public Health Nursing Section of the American Public Health Association. The committee appointed is:

Public Health Nursing Section, A.P.H.A.—Margaret K. Stack, Chairman, and Marguerite A. Wales, R.N., Secretary; Vital Statistics Section, A.P.H.A.—Louis I. Dublin, Ph.D., and William H. Guilfoy, M.D.; N.O.P.H.N.—Elizabeth Stringer, R.N., and Harriet Leck, R.N.

As it was exceedingly difficult for the members of this committee to meet for discussion because of geographical handicaps, it was necessary for the material for the prelliminary report of this committee to be assembled through conference and correspondence.

The committee in submitting this preliminary report recommends that a "minimum report form" be drawn up for small organizations which could form the basis of all reports, the organizations of large cities building upon this skeleton form. It would seem desirable that the committee which draws up such a report form include in its membership representatives from the smaller organizations.

Meantime we ask your consideration of the following preliminary report:

PRELIMINARY REPORT

Owing to the varied conditions, types of service, and equipment under which visiting nurse associations operate, it would make for better understanding of the work being done throughout the country if a standard form for annual reports could be adopted. Such reports should have an accepted statistical foun-

* Report of the Committee, presented to the Public Health Nursing Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 21, 1925.

dation which will make them sound nursing material, available to all workers in the public health field.

Before listing the contents of an annual report, it is necessary to consider the purpose such a report should serve. The following is an attempt in brief to state the purpose and the methods of carrying out the purpose of the report:

I. What is the purpose of an annual report?

1. To account to the public for the uses of the money received.

2. To stimulate a further interest by a portrayal of conditions in the community requiring service, and of results obtained during the past year with the service available.

3. To bring about an effective coöperation in community health work throughout the country by an intelligent discussion of statistical data which will be comparable because of an agreement on definitions of certain terms and on methods of compilation and presentation of the statistical material compiled.

4. To aid organizations to conserve and direct their resources, by statements as to methods of economical adjustments in rendering services by means of time and cost studies, etc.

II. How can the purpose be best fulfilled?

1. By a general report from the president and director stating the principal aims of the organization based presumably on the needs of the community. From the administrator's point of view much assistance could be gained if figures were available in regard to travel, record, and field time. The visiting nurse association is the key group for studying morbidity situations, and much valuable data could be prepared by taking groups of diseases and trying to establish a morbidity rate according to age. The layman who is giving his support to such work will find much of interest in figures which show just how far his money will go in meeting the community demands.

2. By an outline in brief of the various branches of the service instituted to carry out the aims; for instance, the statement here could contain information as to whether the organization carried solely a staff for acute sickness situations, or whether it included acute sickness, chronic sickness, maternity, clinic service, health education and public health teaching.

Statistical material should be presented in connection with the various services:

Number of staff apportioned to each service

Amount of time spent in each service

Per cent distribution of the entire work among the various services (This might seem an appropriate place in which to enter a brief survey of the community facilities and a justification of emphasis on any one or more branches of the organization's work.)

Number of cases and visits

Age groups

Nationalities

Morbidity and mortality statistics by disease groups

Duration of visits and number of visits by diseases (See Dr. Louis I. Dublin's *Records of Public Health Nursing* for a uniform method of tabulation of statistics above mentioned.)

3. By statement of budget and costs. A complete statement of budget should be included in every annual report. The items to be included and how these should be entered and defined are covered in the *Report of the Committee to Study Visiting Nursing* of the N.O.P.H.N.* Statistical material based on the suggestions of this report will afford also a detailed study of the costs of various services if an organization is equipped to gather and tabulate this additional data. In this connection, the following are suggested as valuable and interesting where possible to obtain:

Cost per visit and time spent in each function which nurse performs; *e.g.*, office, travel, assigned duties, clinic work, field work, and, further, time spent in different types of field work; costs of service time (using such a unit as the hour for a basis). From this could be readily computed the amounts expended on maternity work, on acute sickness visits, etc.

Type of work accomplished.

Number of visits by type.

4. By statement of future plans of work and recommendations for progress of public health work in general.

MARGUERITE A. WALES, *Secretary*

* Metropolitan Life Insurance Co., 1925.

DETERMINING THE GERMICIDAL EFFICIENCY OF DISINFECTANTS*

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OUR so-called standard methods of testing the germicidal efficiency of disinfectants have never been entirely satisfactory. Within recent years, especially, most workers in this field of bacteriology have agreed that a "phenol coefficient," determined by either the Rideal-Walker or the Hygienic Laboratory method, is nothing more than an indication of the germicidal efficiency of specific substances against the test organism, *Bacillus typhosus*, under the specified conditions. Various laboratories have in many cases deviated from the published methods in testing disinfectants, but have indicated that their results were obtained by one or the other of the accepted procedures. Individual workers have not been satisfied with every detail of these methods and have consequently made changes which they have considered justifiable. This has in most cases been responsible for lack of uniformity in results obtained. However, different laboratories attempting to make comparative tests on specified disinfectants by means of the Rideal-Walker and Hygienic Laboratory methods found considerable variations in results under the best conditions.

The Committee on Standard Methods of Examining Disinfectants of the American Public Health Association, seeing the need for a more accurate method for testing disinfectants,[1] made a number of changes in the existing Hygienic Laboratory Method, adding the refinements needed to increase its accuracy. This method was accepted and published as the "A.P.H.A. standard phenol coefficient." This method while fairly accurate was far too complicated, cumbersome and expensive to be practicable in routine testing of disinfectants and was never generally used. The slight increase in accuracy of the results obtained by this method over that of those obtained by the Rideal-Walker and Hygienic Laboratory methods did not justify the expenditure of time and effort necessary to obtain the information desired. After all, the knowledge gained by the use of this elaborate procedure was nothing more than a fairly accurate estimation of the strengths of disinfectants necessary to kill one pathogen, *B. typhosus*, as compared to the strength of phenol necessary to accomplish the same result under the conditions of the test. The A.P.H.A. method was later abandoned by the Committee on Standard Methods.

However, one important suggestion made was that future work on disinfectants should include the use of disease-producing types of bacteria other than *B. typhosus*, and should be in the nature of phenol coefficient tests. It is generally conceded that further complication of the method of testing disinfectants would not be favorably accepted by those who have to do the actual work; in fact, a simplification of procedure would be most welcome. The writer has already suggested[2] that disinfectants be tested against representatives of the most important groups of pathogens in the simplest manner possible. That is, the dilutions of disinfect-

* Report of the Referee on Standardization of Disinfectants read before the Laboratory Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 19, 1925.

ants which will kill various pathogens should be determined without any comparison to phenol as a standard. A phenol control should always be used, of course, as a check on the resistance of the culture. Although there may not be an accurate correlation between the resistance of organisms to phenol and the irresistance to other disinfectants, for the present we are justified in judging the resistance of test organisms by their resistance to phenol. Such control should be included in each test when the various pathogens are used. In this test there would be no figures showing the strength of disinfectant as compared to phenol, but simply information as to the efficiency of certain dilutions of disinfectant against pathogens met in practice. The phenol control would be used solely as a check on the resistance of each particular culture used at the time the test was made.

The seven pathogens representative of their respective groups, already suggested[2] as test organisms for determining the dilution in which disinfectants will be effective against them, are:

B. typhosus (representative of the Gram negative, non-sporing bacilli)

Staph. aureus (representative of the suppurative group, and also Gram positive cocci)

B. diphtheriae (representative of granular Gram positive group, and diphtheroids)

B. tuberculosis (representative of the acid-fast group)

Dip. pneumoniae (representative of the encapsulated, Gram positive cocci)

Strep. hemolyticus (representative of the septicemic pathogens, scarlet fever organisms, erysipelas, etc., Gram positive chain-forming cocci)

B. pestis (representative of the hemorrhagic-septicemic group)

A preliminary attempt was also made to establish a standard for *Staph. aureus* strains for use in such tests, after studying the resistance of 25 strains of this organism to phenol. The results of this study suggested that the strain of *Staph. aureus* to be used in disinfectant testing should have a certain resistance to phenol. It should not be killed by 1–70 phenol in 10 minutes, nor by 1–80 phenol in 15 minutes; it may or may not be killed by 1–60 phenol in 5 minutes, this dilution being on the border line. When a disinfectant is recommended for a purpose in which the killing of suppurative organisms would be expected, and certainly desired, such as hand disinfection, treatment of cuts, wounds and sores, and hospital disinfection, it should be tested against a vigorous resistant strain of *Staph. aureus,* one which comes within the limits specified in the standard suggested.

Certain factors under practical conditions may be hard to include in laboratory tests—conditions that may interfere with the efficiency of the disinfectants. It is well, therefore, to allow for a margin of safety and use enough culture to allow for the maximum of organisms and a certain amount of organic matter. A dilution of 1 part culture to 10 parts disinfectant seems adequate. In the Rideal-Walker technique, 0.5 c.c. of culture to 5.0 c.c. of disinfectant dilution is used. This proportion has been used also in the work on *Staph. aureus* reported previously,[2] and in subsequent work to be reported later. The results obtained with broth cultures filtered through filter paper were the same as those obtained when unfiltered cultures were used. The tests were carried out at 20°C. Test cultures were made in beef extract broth, pH 6.5 to 6.8 and 24-hour cultures were used (after transferring daily for 5 days). Transfers were made into 10 c.c. of similar broth, and incubated at 37°C for 48 hours. Under such conditions *Staph. aureus* did not vary more in its resistance to a coal-tar compound of definitely known composition than did *B. typhosus.* This disinfectant was tested at various intervals over a period of 7 weeks, both *B. typhosus* and *Staph. aureus* being used under the same conditions. The dilutions required to kill the two organisms differed greatly, but varied as much for one as

for the other, and this only slightly. We can say, then, that as a test organism *Staph. aureus* is as reliable as *B. typhosus* under specified conditions.

Under proper conditions *B. typhosus* is a very good test organism, and there is no reason for abandoning it. We are interested here, not in substituting a test organism for *B. typhosus,* but in adding other pathogens as test organisms. In order to determine accurately the efficiency of a disinfectant against pathogens, various organisms, including *B. typhosus,* should be used. Manufacturers of disinfectants, before recommending dilutions for their products, should have definite information regarding strengths necessary to kill pathogens representative of the most important groups. From a regulatory standpoint, it would only be necessary to test disinfectants against these pathogens in the dilutions recommended by the manufacturer. If a dilution of 1–100 is specified for general disinfection, for the body, wounds, etc., this dilution would then be tested against the proper pathogens for, say, 5 and 15 minutes.

Because of the known specificity of many disinfectants, it is desirable that specific information be had concerning the efficiency of various substances against all the pathogens that the physician might wish to kill. For example, it is known that pine oil, which is very effective against *B. typhosus* and certain other pathogens, is of no value against *Staph. aureus.* It is possible that a similar specificity may be found for other disinfectants as well. For substances used for wound disinfection, the tubercle bacillus would not be used as a test organism, but those disinfectants to be used in tuberculosis sanatoriums should be tested and found efficient against this organism. Disinfectants for use around the ordinary hospital should kill the ordinary Gram negative nonsporing organisms and the streptococci, staphylococci, pneumococci, and diphtheria bacillus. Also those substances used for general household disinfectants for use on cuts, wounds and sores should kill *Staph. aureus* in the dilutions specified.

Naturally in such tests the resistance of the organisms employed must be taken into consideration, or rather, only such strains of these organisms as are shown to have high natural resistance should be used. In the Rideal-Walker test it is specified that the culture of *B. typhosus* used should be discarded if it is killed by 1–110 in 2.5 minutes, or if it is not killed by 1–90 dilution in 7.5 minutes. A somewhat similar standard has been suggested for *Staph. aureus* whereby the resistance of the strain used may be gauged by selecting only those which come within the limits of this standard. Some such standard must be established for every organism to be used in disinfectant testing. For this purpose it will be necessary to test a number of new isolations of the organisms selected against a known, constant germicidal substance, such as phenol. From my study of ten new strains of *Streptococcus hemolyticus* I am prepared to offer a tentative standard for these streptococci. Only ten strains were used: twice this number should be studied before a definite criterion is accepted.

Streptococcus hemolyticus grows very readily and abundantly in glucose broth of pH 7.2 to 7.4. It will grow well in plain broth of the same pH also, but less luxuriantly. A few strains were grown in dextrose broth for 5 days, transferring at 24-hour intervals, and tested for their resistance to phenol, using a technique resembling in some respects both the Rideal-Walker and the Hygienic Laboratory tests. At the same time similar tests were made with cultures grown in the plain broth, pH 7.2 to 7.4. Owing to the formation of acid from glucose, the organisms in glucose broth were killed by a much more dilute solution of phenol than those in plain broth. A culture grown in glucose broth was killed by 1–110 phenol in 5 minutes, but when grown in plain broth of pH 7.2 it was not killed by 1–70 phenol in 5 minutes, nor by 1–80 phenol in 10 minutes.

Therefore, in the tests made with streptococci, the following technique was employed: Isolations were made from fresh pathologic material, transferred into glucose broth in order to obtain vigorous growth, inoculated into plain broth, pH 7.2 to 7.4, and cultured in this medium for 5 days at 37°C, transferring at 24-hour intervals. On the 5th day, 0.5 c.c. of the plain broth culture was added to 5 c.c. portions of various dilutions of phenol held at 20°C for 5, 10 and 15 minutes, at the end of which time transfers were made into 10 c.c. of *glucose broth* and incubated for 48 hours at 37°C. The material was transferred into glucose broth because it was found that when only a few living organisms, weakened by exposure to phenol, were added to plain broth they would not grow, whereas conditions in glucose broth were so favorable that these weakened organisms grew.

Following this technique, ten strains were tested against the following dilutions of phenol: 1–70, 1–80, 1–90, 1–100 and 1–110. The growth in the subculture tubes was confirmed. The following results were obtained: 5, or one-half of the strains were killed by 1–70 phenol in 5 minutes, 8 of them by 1–70 phenol in 10 minutes, and all of them by 1–70 phenol in 15 minutes. All strains survived exposure to 1–80 phenol for 5 minutes, 7 survived 1–80 for 10 minutes, and all were killed by 1–80 for 15 minutes. None of the strains was killed by 1–90 in 5 and 10 minutes, and only one by 1–90 in 15 minutes. From these data it can be safely concluded that strains of *Strep. hemolyticus* to be used in testing disinfectants should not be killed by 1–90 phenol in 15 minutes nor by 1–80 phenol in 5 minutes under the conditions specified, or strains should not be killed by 1–90 phenol in 15 minutes, and should be killed by 1–70 in 10 minutes.

Just how long these strains will retain their resistance to phenol or any other disinfectant when carried in artificial media is not known at present. It may be assumed that they will not continue resistant so long as *B. typhosus* and *Staph. aureus* under the same conditions. In a hormone agar or even in egg-meat medium, however, they may be expected to retain their vigor and resistance for some time. Even if they should not continue resistant for long periods of time in artificial media, it would be simple enough, and convenient in the laboratories where disinfectants are tested, to obtain new isolations from time to time. The value of the information obtained by the use of a streptococcus in testing disinfectants justifies any inconvenience which might be entailed in obtaining new strains at various intervals.

Although there are many reasons why the phenol coefficient test as now used might well be replaced by the scheme here outlined, it seems advisable to continue its use in some form until the details of the new plan are perfected. Some comparative figure on *B. typhosus* found by a simplified test should probably be retained until this scheme has become firmly established.

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THE FUNCTIONS OF A STATE BUREAU OF VITAL STATISTICS*

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A SURVEY of the work of bureaus of vital statistics would show that registration of births and deaths is the principal, if not the sole, statistical function of most bureaus in the United States. A recent decision of the Supreme Court of Georgia declared unconstitutional the attempt in that state to pay local registrars from county funds, because it held that the collection of such data was not essential in providing "necessary sanitation." No member of this Association would hesitate an instant in affirming that vital statistics are indispensable to progress in public health.

Can it be that in the enthusiasm for securing universal registration of births and deaths in the United States, the importance of vital statistics in measuring local sanitary and hygienic conditions has been neglected? It seems timely to consider whether the expenditure for the collection of vital statistics in a state is a "necessary sanitary" measure.

From the beginning, registration of births and deaths has been coupled with an analysis of the returns to determine causes and trends of mortality. Newsholme says[1] in regard to the origin of registration in England:

"The first London Bills of Mortality were compiled in the reign of Henry VIII, about 1538. Their weekly resumption in 1603 was caused by the desire for information as to Plague, which was then prevalent. Thus Plague gave an impetus to vital statistics, just as the first invasion of cholera in 1831 hastened the establishment of national registration of deaths."

The researches of Captain John Graunt (1620–74) in "Natural and Political Observations . . . upon the Bills of Mortality," show that these Bills of Mortality were almost immediately subject to analysis for whatever light they might throw upon the trends of mortality.

The one man associated with the establishment of registration in England was William Farr. To him registration was only a means to an end.

Early utilization of the death registration of Massachusetts by Lemuel Shattuck, in the *Report of the Massachusetts Sanitary Commission* of 1850 and by E. B. Eliott in the construction of the first Massachusetts Life Table in 1857 showed the local sanitary value of those records. Notwithstanding this beginning, there has been in the United States a tendency for state bureaus of vital statistics to focus attention principally on the collection of records of births and deaths.

This tendency is explainable partly from the fact that there is no federal constitutional provision for registration of births and deaths. National vital statistics awaited each state passing and enforcing registration laws. With the establishment of a registration area for deaths in 1880 and permanent provision for the same in 1902, the immediate objective has been the securing of complete registration. One by one, states have

* Read at the first session of the Vital Statistics Section of the American Public Health Association at the Fifty-fourth Annual Meeting at St. Louis, Mo., October 19, 1925.

been admitted, until it is hoped that 1930 will see all states in the registration area.

Since the price of complete registration is eternal vigilance, the major efforts of each state bureau of vital statistics have been and always will be devoted to this activity. On the other hand, the time has arrived when it has become feasible, desirable, and indeed urgent that proper provision should be made for analysis and full utilization of these data by states in order to meet the needs of rapidly developing local health organizations. The position of the bureau of vital statistics in most states as an integral part of the health organization implies such a function. State and local health officers need and expect to secure advice as to the evaluation and distribution of their efforts.

In the past, many states have relied on the federal mortality statistics for tabulations of the data collected locally. It is desirable for a single agency to edit and classify causes of death so that they may be comparable in all states alike. Such a common agency has helped tremendously in securing uniform procedure in registration and certification of causes of death. The rapid growth of the registration area has limited the amount of detail which can be presented in annual tabulations and consequently, for most distributions, the state has been the unit of tabulation in census mortality reports. While this unit may be satisfactory for national comparisons, it fails to meet the needs of state, city, and county health officers for detailed analyses of local data. The tabulations of the Bureau of the Census should therefore be supplemented by such additional tabulations as will bring out groupings which are locally useful, and by analyses which are locally significant.

To be concrete, the unit for health work in most states is now recognized as being the county. The increase in the number of full-time county health units has been rapid during the last 5 years. No bureau of county health organization can function properly unless it is furnished constantly with not only the actual mortality from various causes in each county but a critical study of the trend of mortality in individual counties and groups of counties.

The bureau of county health organizations needs this information; first, to present to groups of people in counties contemplating health units, and second, to present to appropriating bodies later for measuring results achieved. To be of value these studies must be based not on a single year's experience, but on an experience covering a long period of years. (In passing, attention is called here to the fact that studies in this field are seriously handicapped by the fact that the federal census does not publish age statistics of county population even in broad age groups. Action should be taken in this section towards insuring such publication for the returns of the next, 1930, census.)

Other bureaus of the state health department require analyses of state mortality experience according to local groups. The work of the bureau of maternity and infant hygiene in determining and relieving the hazards of childbearing and infant life cannot be effective without such studies. The bureaus of epidemiology, tuberculosis control and others have just as great a need for them.

The report of the Committee on Educational and Professional Standards for Vital Statisticians last year called attention to this need of more detailed analysis of vital phenomena by state bureaus of vital statistics. It is apparent that the time has arrived when each state should make adequate provision in funds and personnel for the proper analysis and investigation of mortality trends and other movements of its population in such detail as to make the data locally useful. It is poor economy for a state to have an elaborate system for the collection of vital statistics and then provide no means for utilizing the data thus gathered in promoting the development of public

health activities. No factory would install an elaborate set of records for cost accounting and then not furnish the accounting bureau with the facilities and personnel to analyze the data thus secured.

The collection of vital statistics in the United States will be on a vastly sounder basis as a necessary part of health work when state registrars make adequate provision, as well, for analysis and interpretation of these data so that they are locally useful. There will then be no question as to the "local sanitary significance" of vital statistics.

REFERENCE

1. Newsholme, Sir Arthur. Vital Statistics. 1923, p. 23.

DISCUSSION BY G. A. THEILMAN

Statistician State Board of Health, Jefferson City, Mo.

As the basis of vital statistics stands the earnest, wide-awake, sincere, industrious, broad-minded, philanthropic doctor. His profession is fraught with sacred obligations. No career in all human activities rises above the realm where he holds sway. He deals with man directly. He yearns to keep him fit. He studies the human mechanism in all its wonderful intricacies so that he may put it in order when thrown out of adjustment. He is the coworker with God keeping the master-creation in trim to function happily.

The doctor is man's guardian through all the stretch of life between birth and death. The physical body flourishes under his direction and care, thereby not only making possible all material progress but also insuring the development of every phase of spiritual growth of which the soul is capable. To accomplish his tasks, to fulfil his mission, he entertains no fear; he spares no pains; he quails before no obstacles. He ministers to all; the rich and the poor, the cultured and the uncultured, the high and the low, are all benefited by his helpful care and timely advice. No matter how dangerous or infectious the disease he falters not but strains every nerve to save the suffering. He foregoes all pleasures, misses his meals, throws aside his cherished plans, breaks his much needed rest, and sacrifices his own conveniences and comfort for the sake of alleviating the suffering of his patient.

Such a doctor is a benefactor and truly realizes his exalted station. For 15 years, since the law for the registration of births and deaths has been enacted, he has carefully, promptly, and regularly made out birth and death certificates and seen that they were punctually delivered to the local registrar. The division of vital statistics wastes no time worrying over such a doctor. His services are a blessing in keeping the records and a boon to all concerned. He fully recognizes the value of recording births and deaths and sympathizes with the people who need the records.

THE VALUE OF VITAL STATISTICS

Under the influence of such doctors the public is rapidly learning that registration affords a compact and convenient history of every human life, guarded under lock and key in our state capitol. Every business, profession and social organization seeks these valuable records. They form the working machinery that stimulates man's activities. Every hour these annals are anxiously consulted under strict legal direction.

The courts pause in the midst of their rushing duties; insurance companies withhold their funds; the government turns a deaf ear to the just pleadings of widows and orphans; and multitudes are denied their rightful ownership until the birth and death records clear the way for action.

The certified copy clerks are constantly busy sending out copies of birth and death certificates to all who request them and gladly pay the required fee of 50 cents.

The urgent need of these certificates is clearly evident. They prove the legality of heirs, the right to make contracts, to be admitted to the professions, and to hold public office. They determine your right to vote, to marry, to enter school, to settle insurance, and to receive pensions. They furnish evidence for enforcing laws concerning education and child labor, relations of guardians and wards, the obtaining of passports, and the exemption from or the right to jury and militia service. They are used for probating wills, settling estates, establishing the facts of heredity and ancestry, protecting your citizenship and proving your nationality.

The patriotic, hard-working doctors of our great state who take pride in complying with the law know well that these certificates serve

a still higher purpose. They look forward to building a nation of healthful, robust, energetic, powerful people. They give the data that enable us to prevent scores of dangerous diseases; they tell the relative healthfulness of different localities; assist in regulating the shipment of dead human bodies; determine the birth and death rate in any part of the state; enable us to get the infant death rate; and determine the ratio between births and deaths. They tell a clear story of at what age and from what cause the largest number of infants die, and thus show what must be done to prevent the unnecessary loss of life.

THE INDIFFERENT DOCTOR AND NEGLIGENT REGISTRAR

There is another class of doctors, quite indifferent, who have not the interest of the people at heart. These doctors keep down the records and prevent the state reaching the standard necessary for coming into the birth registration area. To bring these doctors up to working efficiency is the paramount aim of the state board of health. The people deserve the protection the law proposes to give them. Most of the doctors are rigidly complying with the statutory requirements, but those who fail to do so weaken the records and in many cases render statistics useless for real practical purposes.

A few doctors or registrars spoil the records even when the majority do their whole duty. A chain is only as strong as its weakest link and it is our aim to mend the weak links. Napoleon, on retiring for the night, told his secretary not to wake him when favorable news came, but to rouse him immediately when reverses were announced. So, for the sake of the people it is our business to look after the delinquents. These must be brought to time.

But how shall we reach the doctor or registrar and cause a change in his ways when earnest appeals, stern reproofs and kind persuasion have proved to be futile in all our efforts? It is true there are shortcomings in all activities. We know the value of genuine religion, but we have on all sides the irreligious; we know the value of thrift and industry, but we have an abundance of the lazy; we know the great good of sincerity and hearty endeavor, but we have the indifferent everywhere. All intelligent people know the necessity of birth and death registration, but here too the weakness of humanity shows.

The American people do not yet understand the meaning of independence and they abuse their freedom. They cannot fully submit to organization and necessary government. Machine discipline and sacred obedience to law have not found lodgment in the hearts of the entire people. In general we are progressive, industrious and fairly happy, but our efforts are spasmodic, misdirected and untrained; therefore there is great waste.

Many of the registrar doctors and others complain that it does not pay to do the registration work because of the meager salary allowed the registrar. This is a universal complaint with all workers in all occupations. It is very doubtful whether increased pay alone would improve the records. There is something more potent and effective than the selfish mercenary spirit. The future welfare of all people cannot be secured without some willing sacrifice on the part of those charged with helpful duties. Our education must take a turn, a swing about. It is urged that knowledge should be acquired in our schools in order to secure a salary. The enjoyment of useful knowledge for refined culture, thoroughness in the acquisition of learning, and the excellent service a well trained person may render, are points too little dwelt upon. These make for the growth of a worthy character, especially when guided by a patriotic whole-souled instructor. A satisfactory salary follows as a natural consequence. Aiming at mere salary encourages poor preparation and lack of appreciation for efficient service.

Incomplete and illegible certificates are most annoying and time wasting. The loose statements as to the cause of death require much time and expense to rectify, all of which could be avoided by heeding the instructions furnished the doctors and registrars. Sometimes it takes hours to decipher the unintelligible scrawls that attempt to give the cause of death or represent the doctor's name and address. Often no interpretation of the certificate can be obtained until additional information is received from the registrar. How easy it would be to avoid all this trouble and delay if the doctor took pains to write each letter full and plain in every word. Each month several hundred certificates must be returned from the central office to the registrars on account of carelessness. It is carelessness, for many times the most learned and highly reputable doctor gives the greatest trouble in this matter.

HOW TO PREVENT VIOLATIONS OF THE LAW

In regard to the violation of the registration law it has often been suggested that the violators should be handled by due process of law and, if found guilty, punished according to the penalties imposed by the statutes. One or two cases successfully prosecuted would establish a precedent that others would be dealt with in the same manner.

Yet we sometimes hesitate to be abrupt with those we consider to be enlightened people. Will force permanently improve the actions of mankind? Even Confucius of old, the great Chinese lawgiver, 500 B.C., advised that if you "guide the people by law, subdue them by punishment; they may shun crime, but will be void of shame. Guide them by example, subdue them by courtesy; they will learn shame, and come to be good." This slow process may be more effective, more conducive to self-respect, and more apt to lay a foundation for true growth, directed from within by individual love instead of the external coercion of fear.

The last patient method we have been trying. Much improvement has resulted. Constantly sending out instructions and encouragement through various channels, posting information in the post offices, giving instructions in the schools, awarding birth registration certificates to parents, and writing hundreds of helpful letters to doctors and registrars, have awakened the people to a just realization of the value of recording births and deaths.

QUALIFICATIONS OF A REGISTRAR

The quality and spirit of the registrars are vastly superior to those of former times. Experience has taught that a registrar must possess a trustworthy character, be sincere and industrious, and know that it requires considerable effort to do things worth while. No person can be a successful registrar without practical intelligence, reasonable education, and love for the work. The people must like the registrar who must always be congenial with the doctors and merit their confidence. A firm friendship should be cultivated with the local newspaper editor. Items of vital statistics will be published gladly which are far more useful than printing that John Stump and family ate Sunday dinner at Ben Smith's home, or Jack Holt has a slight cold, or Widow Jones took a crate of eggs to town Saturday. The registrar should be acquainted with all ministers and teachers in his district. A wide-awake registrar can get the teachers to make talks to the pupils regarding the real value of registering births. When a baby is born the children should know who sends the certificate to the central office for permanent record.

The significant aspect of a human birth is its connection with the sacredness of religion under whose protection it is dedicated to a life of good deeds. All ministers can be of service to the community by their interest in new-born babes and statements from the pulpit relating to birth registration.

WORK OF THE BOARD OF HEALTH

It is well to remember that the state board of health is one of the most useful, most necessary, and most indispensable institutions connected with the peace, comfort, and advancement of our civilization. The doctor equips himself with the knowledge of the ages in order to drive the burdensome scourges from the toilsome path of mankind. There could be no greater and more inspiring duty. To keep the world healthy is the finest coöperation with divine love and wisdom. Complete records of births and deaths give the working material through which the eradication of all hurtful diseases will finally be accomplished.

LAW MUST BE RESPECTED

There is no longer any use of accepting unsatisfactory work in vital statistics. The statutes demand accurate results and the tax payers deserve what belongs to them. Someone has said: "The time has come for a show-down and a turn-about. The strengthening of law enforcement is the greatest piece of unfinished business before the country."

The President of the United States has recently said that a government which does not enforce its laws is unworthy the name of a government, and cannot expect to hold either the support of its own citizens or the respect of the informed opinion of the world. Enforcement of law and obedience to law by the very nature of our institutions are not matters of choice in this republic, but the expression of a moral requirement of living in accordance with the truth.

Under the management of the state board of health, this new spirit of helpfulness, obedience, and righteousness is steadily and certainly permeating the life work of our people through the wholesome influence of worthy examples and genuine education as directed by our sincere health workers and noble army of progressive physicians.

EDITORIAL SECTION

Expressions of opinion and statements of supposed facts are published on authority of the writer under whose name they appear, and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

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THE PURIFICATION OF CONTAMINATED OYSTERS

WITH THE RAPID growth of population along coasts and tidal waters and the continued shortsighted policy of draining raw sewage into the nearest waters, pollution is growing apace and the shellfish industry is being gradually driven to new areas. Many beds still exist in polluted waters and as the investments concerned are large, various efforts have been made to render oysters fished from such beds safe for consumption.

The success of chlorination of drinking waters led naturally to the attempt to utilize chlorine as a purification agent. The method advocated consists of two successive treatments of oysters with chlorinated sea water. The first chlorination, it is assumed, will kill the pathogenic bacteria which might be adherent to the shell and also sterilize the water used for the treatment. When the chlorine content of the water falls to below 1 part per million the oyster will drink, and in the method advocated a 6-hour drinking period is allowed for cleansing of the intestinal tract. As the chlorine initially added would now be inert the water in the tank is again chlorinated to kill the pathogens eliminated. After the chlorine content has been reduced to less than 1 part per million another drinking period of 12 hours is allowed. Very favorable reports have been made on this process and there is no question that polluted oysters so treated will give very satisfactory *B. coli* scores. Reports have also been made that oysters artificially contaminated with *B. typhosus* were freed from *B. typhosus* after such treatment.

The investigations of Krumwiede and Park and their associates reported at the last meeting of the Association emphasize again, what we are too prone to forget, that a negative result in examining for *B. typhosus* is to be taken like the Scotch verdict "not proven," not as an acquittal as innocent. This work was carried out in a manner to take advantage of the most refined methods of isolation available. It was found that treatment of oysters with chlorinated water would lead to a very marked reduction in the number of *B. typhosus* on or in contaminated oysters; but even four treatments with sea water containing 20 parts per million might leave some demonstrable typhoid bacilli on the shells. With six successive treatments with sea water containing about 10 parts per million at the beginning of each treatment, and interim drinking periods, *B. typhosus* was found on and in the oysters, although the apparent purification reached nearly 100 per cent. These results indicate that in spite of chlorination a few typhoid bacilli may persist on or

in polluted oysters and that the figures indicating the apparent benefits of the chlorine treatment will vary with the efficiency of the methods of isolation employed.

These workers also carried out retests on the efficiency of "drinking" in fresh sea water. Here again purification was almost complete after several changes of sea water, but a residual number of *B. typhosus* survived even after further changes of water until the experiment was terminated by death of the oysters. Likewise it was found that the reduction of *B. typhosus* on or in stored oysters was rather rapid but that a small proportion persisted for a time considerably in excess of the longest period of storage in the trade.

This would indicate that of the methods investigated no one alone apparently can be depended upon to render contaminated oysters free from pathogens. With our present knowledge the only safe procedure is to protect oyster beds from pollution and the oysters from contamination in harvesting and marketing. It emphasizes the necessity for continuing strict inspection and supervision of the oyster trade by the public health authorities.

Although chlorination cannot be depended on to render oysters sterile, as long as they continue to be used as food it provides an added safeguard particularly for reducing gross pollution should this occur in spite of the strictest sanitary precautions. Further, the practice of the trade known as "drinking" would be rendered far more safe if chlorinated water were used in this process. Here chlorination would be an additional safeguard of great value but wherever it is applied chlorination cannot be relied upon to render safe an oyster supply known to be or suspected of being polluted.

POPULAR MEDICINE [1]

A RECENT NUMBER of the *Saturday Evening Post* takes the medical profession to task for its inability and ineffectiveness in putting over to the public the gospel of good health. It charges the medical profession with being the most tongue-tied of all learned professions, and apparently thinks that doctors still adhere to the dead languages in their manner of speech and of writing. It commends their zeal for scientific advancement and knowledge, but implies that much of this knowledge remains barren because it does not become the common property of the layman. The editor speaks of the doctor's love for long accurate Greek and Latin words as being his besetting sin, and charges him with the lack of ability to write simply racy English, which would make his message attractive and understandable. Physicians and surgeons are charged with having for years considered the lay press common and unclean, and now that the educative usefulness of newspapers and periodicals is recognized, they are unable to use the mighty engine they have for so long despised. As the result of this, fully twenty-five million people in the United States are permanently sick, and the economic loss through death and disability runs into billions. The cost of a campaign of popular education is recognized, but the writer of the editorial believes that if the doctors supply the brains, the business world will furnish the money and the newspapers the white paper.

Every physician and sanitarian recognizes that there is a grain of truth at the bottom of this statement, but we cannot believe that the *Saturday Evening Post* has diagnosticated the situation correctly. The American Public Health Association has for years considered the establishment of a popular health magazine. Its

efforts to obtain support for this project have been absolutely unavailing. Two years ago the American Medical Association, which is well equipped financially, did establish a popular health magazine which the physicians of the country are aiding quite generously to put in the hands of the public. Many daily papers are running health talks, and no discovery of any moment is made that does not find expression in numerous newspaper articles. We can point to the discovery of insulin in the treatment of diabetes for example. There is scarcely a country newspaper in any part of the United States that has not had repeated articles on this subject, most of them written in good style by competent physicians. The recent alleged discovery of the cancer germ, although it holds out nothing practical, has likewise been heralded from one end of the world to the other, and we cannot at the moment recall any medical discovery of value which has not been given to the public freely and in good form. The *Saturday Evening Post* itself has run series of articles by at least two physicians, of whose style it evidently has a good opinion. It should, therefore, be able to judge of the success or failure of such articles in putting over a message to the public.

We have already said that the *Post* has not in our judgment diagnosticated the situation correctly nor do we pretend to be able to do so ourselves, though there are certain evident factors which militate against an effective campaign for popular medicine and which make the task distasteful to the average physician. The first of these factors is the love of sensationalism. Newspapers run health columns, and while some of these are written by dignified physicians of good standing, other papers select men who are not known for their medical qualifications. The result is that newspaper medicine has fallen into bad repute. The average newspaper will make a "story" out of any bit of information given to it. At a recent meeting of the National Academy of Sciences a perfectly justifiable report was made on the finding of the bacteriophage in sewers. This was fairly widely published in the newspapers under the scare heading "Cure for Typhoid Found in Sewers." The list of such distortions of the truth could be extended indefinitely; so the respectable scientist and physician is chary about giving material to the average newspaper.

A second difficulty lies in the love of the public for the miraculous. Barnum said: "The American people like to be humbugged," and the fortune he accumulated attested the truth of his observation. The newspapers, with a few honorable exceptions, cater to the public and more or less reflect this attitude. The reputable scientist or physician dislikes to have what he considers a sacred truth distorted and made light of. It is perfectly true that many physicians do not know the correct popular use of the English language. Their training is all against it. They are taught to be observant, accurate and deliberate in reaching conclusions. None of these qualities conduce to popular writing. In spite of these drawbacks, we are convinced that there never was a time when so much correct medical information was being given to the public. While we recognize the value of this and believe that it should be done, we are convinced that the proper way of solving the problem is in the primary schools where the fundamentals of anatomy and physiology particularly must be taught along with the A B C's. A child who has always been familiar with the functions of the nerves, the heart, the lungs, the kidneys, and the digestive system will not readily endorse teachings which claim that these organs have nothing to do with life. He will not easily go to quacks who claim to be able to cure cancer and other incurable ailments, and will not depend upon the prayers of the unrighteous at a distance at so much per prayer. He will not cultivate fetishes nor be deluded by fads.

We cannot but believe that the *Saturday Evening Post* is unduly optimistic concerning the ability to raise money for this campaign, but the fact that it holds such an opinion is at least encouraging to those of us who have tried in vain to arouse interest in such a movement. We are ready to acknowledge our shortcomings in this respect and to accept the guidance of the journal which has achieved such enormous success in reaching the public. May we accept the editorial as a hint that the owner and publisher of the *Post* is ready to contribute handsomely to such a worthy movement?

1. Good News Suppressed. *Saturday Evening Post*, Jan. 30, 1926.
NOTE: See also p. 335 of this issue.

ETHYL GASOLINE GIVEN CLEAN BILL THUS FAR

THE FINDINGS of the special committee appointed by the Surgeon General following the conference held in Washington, May 20, 1925, to investigate the hazards to the public from the use of "ethyl gasoline" (tetra-ethyl lead in gasoline) were announced at Washington, January 19, 1926. As a result of the previous conference the manufacturers of ethyl gasoline stopped the sale of this product throughout the country. More than 300,000,000 gallons of the product had been distributed between February, 1923, and May, 1925. Serious cases of poisoning occurred in New Jersey and Ohio at plants where tetra-ethyl gasoline was manufactured. Dr. William H. Howell, chairman of the committee, read the report, the findings of which he said were unanimous. No cases of lead poisoning were found among 134 garage workers or users of ethyl gasoline who were the subject of special study. Blood and stool specimens were all sent to Washington under code. Control groups of 118 men not exposed to ethyl gasoline were equally carefully studied, 61 of whom had a serious exposure to lead in two industrial plants.

"In view of these conclusions your committee begs to report that in their opinion there are at present no good grounds for prohibiting the use of ethyl gasoline of the composition specified as a motor fuel, provided that its distribution and use are controlled by proper regulations." The adoption and enforcement of such regulations, the committee feels, belongs to the several states after the office of the Surgeon General has formulated them. The findings of the committee substantiated those experimentally determined previously by Dr. R. R. Sayers and coworkers of the U. S. Bureau of Mines, at the Pittsburgh Experiment Station; also those by Dr. Robert A. Kehoe, of the University of Cincinnati, who investigated and reported upon the subject previously for the Ethyl Gasoline Corporation, and, among other features, found that persons who are not obviously exposed to lead in any form may still show lead in the stools.

Some industrial hygienists have pointed out for some time that the finding of lead in the urine or in the feces in itself constitutes only a *tentative diagnosis* of lead poisoning, and that lead poisoning only exists when evidence of *actual intoxication* is added to one or another of these or similar findings plus a history of exposure, if possible. Symptoms of intoxication are the usual ones of nausea, vomiting, headache, pains, colic, etc., one or more of which is usually peculiar to the given intoxicant, such as colic in lead poisoning. Such symptoms due to other causes must also be ruled out.

The committee also found lead in the stools to be especially prevalent in garage workers in general, where lead was found in the air and dust, whether or not ethyl gasoline was a factor. In fact, ten persons in the Hygienic Laboratory at Washington showed lead in their stools although they had no known exposures to lead. On the other hand, drivers of cars using ethyl gasoline showed no more significant amounts of lead in their stools than control cases who were not using it. Similar results were found in regard to stippled red cells in the blood. Neither group showed any symptoms of lead poisoning. No cases of lead poisoning were found in garage workers where ethyl gasoline had been used for approximately two years.

The investigation was made in Cincinnati and Dayton, Ohio, where ethyl gasoline has been longest used, under the direct supervision of Dr. J. P. Leake, Surgeon, U. S. Public Health Service.

The report bears out the position taken from the first by practically all health departments in the country which have been watching the ethyl gasoline situation and particularly those which had been conferring with the federal bureaus regarding it: *i.e.*, that until some evidence of danger to the public health was forthcoming, health officials were not justified in putting a ban on the distribution of the substance within their respective jurisdictions.

The present committee warns that the subject still bears watching by health officials because the total number of persons studied was comparatively small and the period of approximately two years' exposure is comparatively brief. The members of the committee were Dr. William H. Howell, of Johns Hopkins University, chairman; Dr. David L. Edsall, dean of the School of Public Health of Harvard University; Professor C.-E. A. Winslow of Yale University; Dr. W. S. Leathers of Vanderbilt University; Dr. A. J. Chesley, state health officer of Minnesota; Dr. Julius Stieglitz of the University of Chicago, and Professor Reid Hunt of Harvard University.

THE PRESERVATION OF FOODS

FOOD IS the first necessity of all living things, but it is only within the last few years that the study of foods has been accorded its proper place. Proper nutrition not only makes us what we should be physically, but also avoids many disorders, the origin of which has been more or less a mystery.

There are always people who lack scientific training either through the lack of opportunity to obtain it, lack of ability to acquire it, or lack of persistence in overcoming its difficulties; yet who are always dabbling around the edges of science, using pseudo-scientific language, and posing as scientists before audiences whose knowledge is not sufficient to detect the fraud. To these persons we apply the term "sciolist." The recent discoveries in regard to food deficiencies, and disease due to the lack of food accessories, have given an unusually rich field to this type of person. No one will question the fact that the increase in population of the world has brought many new problems concerning the production and distribution of foods, and of necessity new processes have come into vogue in preservation, storage, and handling of food stuffs.

A particularly sane and comprehensive report* was recently given by Dr. Savage before the Section of Public Medicine of the British Medical Association.

He points out that certain manipulations are necessary to preserve perishable foods, to render foods more digestible or more palatable, or to produce new types of food from basic food stuffs. On the other hand, there are substitutions in part or in whole, and accidental contaminations which may be chemical, bacterial or parasitic.

There is a class of writers who hold that foods should not be manipulated, but that they should be taken as they come from "nature's laboratory," holding that any manipulation destroys the value of the food to a greater or less extent. Carrying this idea to its logical conclusion would make us eat skin, pith, seeds, etc., of all fruits, and its absurdity is evident. On the other hand, there has been some reason for believing that the over-cooking and other manipulations of certain foods destroys or injures to a great extent the food accessories. Much study has been given to this question, and the reassuring statement may be made that we are now able to can or preserve pretty nearly every sort of food without impairing the vitamin content to any marked extent. Yet we have even stronger evidence that the excessive purification of certain foods, flour and rice for example, definitely takes away a very important vitamin. The condition of the children in Vienna was a clear demonstration of the ill effects brought about by the lack of vitamins. It is being assumed by some that many diseases and defects are due to deficient vitamin intake, among which tuberculosis, dental decay, etc., have been mentioned. At present these are pure assumptions and no proof has been given of them.

Recent evidence has shown that a deficiency of vitamin in the food is associated with degenerative changes in the mucous membrane of the digestive tract, and this in turn lowers the resistance to bacterial infection through the small intestine, but up to the present this has only been shown to be true in experimental work upon animals. In still another type of disease the evidence of certain chemical deficiencies is perfectly clear, as in the association of endemic goiter with insufficient iodine supply. A deficiency in one of the vitamins combined with some other factor or factors has been clearly shown to produce rickets.

Bacterial contaminations have held our interest for a long time, and in the preservation and handling of many types of food, forms of apparatus have been devised by means of which entire processes are carried out with little or no intervention of human hands. When foods furnish suitable media for multiplication of bacteria, human handling is often the most dangerous element, especially in those which are not cooked before eating. A good example of a non-multiplying medium is bread, many million loaves of which are handled without any wrapping, yet we have little or no evidence of infection from this source, but meat products and similar articles furnish a rather prolific source of poisoning. Among meat products those which contain viscera which in themselves are liable to be diseased are those most liable to produce poisoning, and in the manufacture of these special precaution is necessary. Of 203 outbreaks of food poisoning in England 72 per cent were due to made-up or manipulated animal products.

There are several conclusions to be drawn from this lucid exposition of the subject. While we do not belittle the dangers of food poisoning, it is clear that it adds only a very small percentage to our death rate, and even, if for the time being we leave out of consideration the possible remote bad effects of certain food deficiencies, to our national sick rate. While fresh food is, of course, the ideal, it will probably never be available as a general thing, but we can be assured that with the knowledge we have at present and are constantly acquiring, practically all foods can be preserved not only with safety, but with their nutritive properties only slightly altered. It can be positively stated that oxidation and not heat is the chief factor in the destruction of vitamins during canning, and processes now employed

avoid this. We can, therefore, receive foods from distant parts of the world months after preservation whose vitamin content is only slightly impaired.

Nothing in this optimistic statement must be interpreted as condoning carelessness or fraud in the preparation and handling of food stuffs. Cleanliness along the entire line is obligatory. The addition of injurious chemicals will always require official supervision. No amount of care in preparation can justify careshops. A liberal mixed diet will insure one against the bad effects of food lessness in handling and exposure to flies, dust, dirt, etc., which one sees in many deficiency both as regards its vitamin content and its proper balance.

NEW YORK'S HOUSING PROGRAM

THE NEWS that Governor Smith of New York has launched a broad and comprehensive program of housing reform must be received with real satisfaction by the health workers of the country. It has long been realized by those who were conversant with this subject that the United States is being rapidly outstripped by the countries of Western Europe in the provision of adequate housing facilities for the poor, and that the only way in which the problem can be met is by the establishment of some state agency with power to condemn and power to construct model housing or to loan money to other agencies for that purpose. We hold no brief for the details of Governor Smith's plan; it should be studied on its merits and very possibly may be modified to advantage. Those statesmen and journalists who are rending the heavens with outcries about the "radicalism" and "socialism" involved in this program would, however, profit by a little elementary knowledge of what has been going on for a quarter of a century in such "radical" and "socialistic" countries as England, France, Belgium, Holland and Italy. The New York plan is novel only in that it is the first serious attempt on the part of American statesmanship to grapple with a problem which has already been satisfactorily solved by most European countries along the lines here laid down.

ASSOCIATION NEWS

American Health Congress

Plans for the American Health Congress, to be held in Atlantic City May 17–22 under the auspices of the National Health Council, are assuming final shape. Sixteen associations will participate in the Congress. Headquarters will be at Steel Pier, where, besides the various sessions, there will be a large commercial and educational exhibit.

Though the Atlantic City hotels are numerous and large, it is advisable to make reservations early, writing directly to the hotels. Headquarters for the American Public Health Association will be at the St. Charles Hotel. Information on hotels and rates has been sent out and those who have not received such information may receive it by writing to the Association office.

The round trip fare to Atlantic City will cost but one and one-half times the single fare to those attending the Congress. Certificates for securing the reduced rate may be obtained at local ticket offices. The full one-way fare must be paid in going, and then certificates must be validated in Atlantic City between May 18 and 21. The validated certificate will entitle the holder to a reduction on the return ticket. Tickets must be used via the same route both ways, and can be bought from starting point May 13–19, inclusive. Return tickets must be used leaving Atlantic City by May 26.

PROGRAM

The February JOURNAL announced a tentative program. One session of special interest to the members of the A.P.H.A. will be the Joint Session of the American Child Health Association, the Conference of State and Provincial Health Authorities, the National Organization for Public Health Nursing and the American Public Health Association, to be held Friday, May 21. The subject will be "Health Organization for Cities." Three plans will be presented for discussion, covering: Cities of 100,000, prepared by Professor C.-E. A. Winslow and presented in the Report of the Committee on Municipal Health Department Practice, *Public Health Bulletin 136*, 1923; cities of 50,000 prepared by the American Child Health Association and presented in *A Health Survey of 86 Cities*, 1925; and cities of 20,000 prepared by Professor Ira V. Hiscock and presented at a Round Table Discussion before the Public Health Administration Section of the American Public Health Association at the Fifty-second Annual Meeting at Boston, October 10, 1923. After the presentation of the plans, each plan will be separately discussed and criticised by health officers and others. This session will probably last all day and will be the most thorough-going discussion of administration of city health departments that has ever taken place at any of the A.P.H.A. meetings.

A complete program will be given in a future issue of the JOURNAL, when speakers and discussants will be announced. Other scientific sessions are planned, including one on health education and publicity material.

Editorial Committee Changes

The JOURNAL regrets to announce the resignation of Dr. Taliaferro Clark from the Editorial Committee and also from the editorship of the department of Child Hygiene. Dr. Clark has been appointed to take charge of the United States Public Health Service activities in Europe, which necessitates his resignation.

Dr. Merrill E. Champion, Director, Division of Hygiene, Department of Public Health, Commonwealth of Massachusetts, has been elected to succeed Dr. Clark on the Editorial Committee.

Joint Meeting A.P.H.A. and A.S.A.

A joint meeting of the American Public Health Association and the American Statistical Association will be held April 9 at the Aldine Club, New York City.

The following have been invited to present papers: Prof. W. F. Willcox of Cornell University, "The Life and Works of Dr. John Shaw Billings"; George H. Van Buren, of the statistical bureau of the Metropolitan Life Insurance Company, "The Life and Works of

William Alexander King"; Dr. John W. Trask, of the Public Health Service Hospital, "Dr. Cressy L. Wilbur."

Dr. Louis I. Harris, newly appointed Commissioner of Health of New York City, has been asked to preside at the meeting.

DISTRICT OF COLUMBIA PUBLIC HEALTH ASSOCIATION

Through the efforts of a group of professional health workers the District of Columbia Public Health Association was organized in February to be affiliated with the American Public Health Association. In the constitution adopted one of the objects of the association is "to create an interest in and to promote public health." The classification of membership is: active, embracing those professionally engaged in public health work; associate, including those interested other than professionally; sustaining, for those contributing money to carry on projects of the association; honorary, for persons rendering noteworthy service to the public. Not more than two honorary members can be elected to the association each year.

The officers elected were: Victor C. Vaughan, M.D., president; G. M. Kober, M.D., first vice-president; William C. Fowler, M.D., second vice-president, James A. Tobey, secretary; Capt. W. C. Cox, treasurer. Members of the executive committee are: Lieut. Comdr. J. R. Phelps, Lieut. Col. J. F. Siler, Emile Berliner, Miss Gertrude Bowling, Hugh Miller and Miss Melinde Hawley.

SCHOOL VENTILATION

School ventilation, which received considerable attention at the last meeting of the A.P.H.A., was made the subject of much discussion at the 32nd Annual Meeting of the American Society of Heating and Ventilating Engineers at Buffalo, January 27–29. Professor C.-E. A. Winslow presented the major paper of the professional session entitled "Objects and Methods of Ventilation."

In this paper Professor Winslow reviewed the history of the physiology of ventilation, laying particular stress on the work done by the American Society of Heating and Ventilating Engineers at Pittsburgh in coöperation with the U. S. Bureau of Mines and the U. S. Public Health Service, and also that of the New York State Commission on Ventilation. The first important point made was that the commission found 66½°, with low air flow to be more comfortable, than a temperature of 68½°, with high air flow. The second point made was that this desirable condition of 66½° with low air flow may be easily obtained by the window gravity method of ventilation so extensively studied by the commission and held by them to be the cheapest and most satisfactory method of schoolroom ventilation. The unnecessarily high cost of the mechanical system of fan ventilation as contrasted with the window method does not constitute the only objection to its use, as pointed out by Professor Winslow, for the fan system with its necessarily higher temperature is associated with an excessively high morbidity from respiratory disease among the school children studied.

Many members of the American Society of Heating and Ventilating Engineers presented discussion on Professor Winslow's paper, and while in no case were definite and specific data presented, the engineers expressed the opinion that respiratory disease data of the N. Y. State Commission on Ventilation was faulty. Mr. West attempted to show that the cost of window ventilation is greater than the cost of fan ventilation. The complete studies on this point made by the commission, however, show that in the case of the schools studied the radiation in place in the fan ventilated rooms was entirely satisfactory when the use of the fan system was discontinued.

In the concluding sessions of the meeting the American Society of Heating and Ventilating Engineers passed two resolutions: the first, calling for coöperation between the A.P.H.A. and the American Society of Heating and Ventilating Engineers by means of a committee of conference, and the second, stating that the present laws on school ventilation have a positive influence for good and are based on years of practical experience. It is, therefore, they say, unwise to repeal or change these laws until such a time as more information is obtained and definite standards are agreed upon.

PREVALENCE OF SMALLPOX AND VACCINATION ENFORCEMENT

A question has been raised concerning a statement made in the January issue of the JOURNAL, page 54, concerning the relation of the prevalence of smallpox and the enforcement of vaccination. The sentence questioned was "The prevalence of the disease was as a rule in direct ratio to the enforcement of vaccination." Most of the readers

of the JOURNAL are professional health workers and to such informed individuals this statement could have but one meaning, namely, that when vaccination was common there was less smallpox, and where a greater proportion of smallpox cases existed there had been a lesser amount of vaccinations. Lest the opposite interpretation be put on the sentence by the uninformed, the JOURNAL takes this occasion to reiterate its belief in universal vaccination as a certain preventive of smallpox.

LIST OF NEW MEMBERS

Hannah R. Borthwick, R.N., Brooklyn, N. Y., Pre-Natal Nurse (Sheppard-Towner Law), Child Hygiene, Health Department, New York

Ernest Madison Burns, B.Sc., M.D., Huntington Park, Calif., District Health Officer, Los Angeles County Health Department

João Camoezas, M.D., Lisbon, Portugal, Superintendent of the Municipal Bureau of Hygiene (Assoc.)

Joseph A. Cancik, M.D., Prague, Czechoslovakia, Instructor in Hygiene and Microbiology, Docent Charles University, Prague (Assoc.)

David M. Cowgill, M.D., Ponca City, Okla., Superintendent of Health, Kay County, Okla.

Katherine E. Faville, M.S., R.N., Wheeling, W. Va., Nursing Field Representative for West Virginia and Kentucky American Red Cross

Harriet Fulmer, R.N., Chicago, Ill., Supervisor Rural Public Health Nurses of Cook County, Ill.

Clare Gaffney, Washington, D. C., Assistant Superintendent Nurses, U. S. Public Health Service, Washington, D. C.

H. H. Gerstein, B.S., Chicago, Ill., Sanitary Engineer, City of Chicago

Harry G. Grant, M.D., C.M., Richmond, Va., Epidemiologist

Frank E. Greer, A.B., M.S., Chicago, Ill., Bacteriologist, Department of Health, City of Chicago

Agnes Jacobsen, B.S., R.N., St. Louis, Mo., c/o The American Red Cross

Clinton A. Kane, M.D., Richmond, Va., Director, Rural Health, East Virginia, Director Malaria Control

Daniel H. Lawler, M.D., C.P.H., Baltimore, Md., Deputy State Health Officer

Katherine E. Malone, A.B., R.N., Union, S. C., Field Nurse State Board of Health, Columbia, S. C., Bureau of Child Hygiene

Madeline G. Martin, R.N., Springfield, Mass., Director of Nurses, Springfield Nursing and Public Health Association

Roy J. Marshall, M.D., Rome, N. Y., Health Officer of the City of Rome

Edwin H. McIlvain, Philadelphia, Pa., Edw. G. Budd Mfg. Co., and Budd Wheel Co., Philadelphia and Detroit

Wilfred L. McKenzie, M.B., Winchester, Mass., Research Fellow in Child Hygiene, Harvard University Medical School

Professor Roberto Medellin, Mexico, Mex., General Secretary of the Department of Health

Samuel S. Moody, A.B., M.D., Dresden, Tenn., Weakley County Health Officer

Anne C. Munn, R.N., Middletown, O., Director of Bureau of Public Health

M. D. Munn, P.H.B., B.L., Chicago, Ill., President of the National Dairy Council

Don R. Nickell, Lewisburg, W. Va. (Assoc.)

Josiah E. Obert, B.S., New York, N. Y. (Assoc.)

Charles O. Pickel, Santiago, Chile. Chief Sanitary Inspector

Ernest W. Prothro, M.D., Gallup, New Mex., McKinley County Health Officer

Victor R. Quehl, D.D.S., El Salvador, C. A., Dentist of Republic El Salvador's Army (Assoc.)

Edward R. Stapley, C.E., Stillwater, Okla., Associate Professor of Civil Engineering, Oklahoma A. & M. College, teaching all of the courses in Sanitary and Municipal Engineering

Isabel May Stephens, B.S., Washington, D. C., Instructor in Public Health, National Catholic School for Social Service

Daniel J. Sullivan, Kansas City, Mo., Biological Representative, E. R. Squibb & Sons

Jesse J. Weight, M.S., Salt Lake City, Utah, Instructor, University of Utah, Bacteriology Department, School of Medicine

Mary E. Williams, R.N., Tuskegee Institute, Ala., Director, Health Center Work, Tuskegee Institute, Tuskegee, Ala.

T. H. Wilcoxen, Bowling Green, Mo., Health Commissioner, Pike County, Mo.

DECEASED MEMBERS AND FELLOWS

Dwight E. Breed, elected as a member of the A.P.H.A. in 1918 and a Fellow of the Health Education and Publicity Section in 1923, died at his home in Austin, Tex., January 17, 1926. Burial was at Eaton Rapids, Mich., his former home. At the Fifty-fourth Annual Meeting of the A.P.H.A. in St. Louis, Mr. Breed was elected vice-chairman of the Health Education and Publicity Section. He was executive secretary of the Texas Public Health Association.

Nathan E. Brill, M.D., 48 West 76th Street, New York City, elected a member 1919.

Mrs. H. E. Cotton, Shepherdstown, W. Va., elected a member 1921.

George N. McLaughlin, M.D., 320 Summit Avenue, N., Seattle, Wash., elected a member 1924.

David L. Rundlett, M.D., 250 Boyce-Greeley Building, Sioux Falls, S. D., elected a member 1919.

BOOKS AND REPORTS

Microbe Hunters—*By Paul de Kruif. New York: Harcourt, Brace and Company*, 1926. 363 pp. Price, $3.50.

Those who hold that the line between genius and insanity is not well defined will see in this book ground for their belief, while those who believe that genius consists of "an infinite capacity for taking pains" will be disappointed in the picture drawn. It is hard for a scientific man to pass accurate judgment on this book. It is confessedly written for the public—the non-professional public—and gives the story of the great discoveries in bacteriology not only in popular language, but with a dramatization which, though always interesting, sometimes jars on the senses.

It purports to interpret the motives and emotions of the men whose work and discoveries are described and puts words into their mouths which would doubtless shock them were they all alive to read them. Some of the impressions made are distinctly disagreeable. Those who knew Pasteur or who have studied his life, and those who know what he has done for mankind and the animal world, must resent having him called an "untruthful hunter after truth," and the implication that he stuck to misstatements, simply because he personally had made them, is far from the facts. Pasteur stands almost alone in the scientific world as the one man who never published a mistake. His final success and the magnitude of what he did for the human race and for science in general, are acknowledged in the end, and in spite of the rather unlovely characteristics attributed to him here and there, the truth creeps out, when we read of his digging "for good true hard facts." Roux is characterized as "fanatical." Metchnikoff is said to have been "not a sober scientific investigator; he was more like some hysterical character out of one of Dostoevski's novels." We fear the author fails to recognize the Divine Fire.

Beginning with Leeuwenhoek, the first man who ever saw and depicted bacteria, the story carries us through the destruction of the idea of spontaneous generation, the great discoveries of Pasteur and Koch, the development of diphtheria antitoxin, Metchnikoff's theory of immunity, the demonstration of the part played by certain insects in carrying disease, the conquest of yellow fever and finally the discovery of salvarsan. The work of many men besides those mentioned in the table of contents, as well as numerous discoveries in which they took part, likewise appear in the picture.

The book is in fact a history of bacteriology, written in dramatic style and portraying the actors in the drama with a vividness which holds the attention throughout. Those who have pictured the great men of science as bald-headed, begoggled, absent-minded devotees of science, will be shocked at the portrayal given.

In general, from the historical standpoint, the book is correct. There are certain points on which there is room for difference of opinion as the controversy between Ross and Grassi. The only striking omission and error that we have found is that the discovery of the contagiousness of puerperal fever is credited to Semmelweiss. Oliver Wendell Holmes is not even mentioned, though it is well known that he preceded Semmelweiss by some 3 years in this matter. For many years American men did not receive due recognition of their work, and we regret that an American writer has overlooked what was unquestionably a great piece of clinical observation and sound reasoning therefrom done by one of our countrymen.

Doubtless this book will strike the attention of the laity. Doubtless it will lead many to reading scientific facts which would otherwise remain unknown to them. The author is a facile writer full of imagination and rich in simile. He treats great discoveries as great adventures, as undoubtedly they were. He contrasts the search for microbes with explorations in foreign countries, and shows that while explorers only discovered things already well known in other countries, Leeuwenhoek and his followers entered into an absolutely new world and unveiled mysteries not even suspected by the wisest up to that time.

The reviewer has been at some pains to get the reaction of a certain number of non-professional people to the book and is convinced that

it will have a wide circulation and will do much good. Certainly no one can speak of it as a "dry-as-dust" account of scientific work. It is full of action throughout and the reader turns each page with the expectation of finding a new thrill awaiting him on the next. The faults pointed out may be forgiven if the results expected are realized.

The illustrations are poor, some of them crude. Otherwise the printing and makeup of the book are excellent. M. P. RAVENEL

Health Through Prevention and Control of Diseases—*By Thomas D. Wood and Hugh Grant Rowell. World Book Co.* 122 pp. Price, $1.00.

The importance of the school health program is more keenly appreciated than ever before, not only by the professions involved but also by the general public. This book presents methods of prevention of the spread of communicable diseases as a basic factor in this program. The successful control of these diseases demands not only skilled medical and nursing service in the public schools but also the coöperation of school administrators, teachers and parents.

The specific obligation of each person concerned is clearly stated; standard forms and blanks are suggested for the use of school authorities. Each of the common contagious diseases of school children is given brief consideration with a statement as to the nature of the disease, its cause, mode of transmission and methods of control. There is a separate chapter on the diseases of the skin and the mucous membranes.

This should prove a convenient and useful reference book for teachers and school officials. The definiteness with which administrative procedures are set forth will make it useful to school physicians and nurses. C. E. TURNER

San Francisco Cancer Survey (*Second Preliminary Report*)—*By Frederick L. Hoffman, LL.D. Newark, N. J.: Prudential Insurance Co. of America,* 1925.

The Second Preliminary Report by Dr. Hoffman of the San Francisco Cancer Survey is unique in many respects and is certain to arouse the interest of students of cancer everywhere.

Starting with San Francisco, the investigation has now included the following states and localities: Boston, Mass., Chicago, Ill., Buffalo, N. Y., Albany, N. Y., New Orleans, La., Oakland, Cal., Rochester, Minn., East Orange, N. J., and Madison County, N. Y.

Among the lines of study which have been followed is an attempt to coördinate the cancer mortality with the streets and blocks of the different cities and to the population of particular districts. For San Francisco the total number of deaths covering 5 years has now been distributed according to the original place of residence so far as this could be done. It is expected by Dr. Hoffman that this will settle definitely the question of the infectious character of cancer.

The question of heredity has been considered in the light of information supplied by answers to questionnaires of which about 800 have been received. It is hoped that this line of work will make clear the nature of the relationship in family cancer, whether it is a predisposition to the disease which is transmitted, or some mode of living, or a direct disease transmission.

The author says that his questionnaire method of inquiry is providing a large amount of information which strongly suggests that an excess of meat and an excess of sugar in the diet, and the presence of intestinal stasis are connected with cancer in a considerable proportion of cases.

Attention has also been given to the possible connection between rheumatoid affections and cancer, and hard water or drinking water derived from certain sedimentary rocks and cancer; also, the possible excessive consumption of common salt or salted foods in contributing to cancerous affections.

If the present report deals largely with the methods and difficulties encountered in statistical inquiries of this character and seems not to point strongly to conclusions in regard to the questions raised, it but resembles practically every other investigation of this kind. It is to be hoped that as the work progresses many of the questions raised by Dr. Hoffman will be capable of a more positive conclusion than the progress of the work thus far makes possible.

The San Francisco Survey is being conducted under the auspices of the John Hancock Mutual Life Insurance Company, the Pacific Mutual Life Insurance Company and the Prudential Insurance Company of America.

GEORGE A. SOPER

Lactobacillus Acidophilus — *By Nicholas Kopeloff, Ph.D., Associate in Bacteriology, Psychiatric Institute, Ward's Island, N. Y. Baltimore: The Williams & Wilkins Company,* 1925. Price, $5.00.

The use of sour milk to prevent intestinal decomposition and the harmful effects resulting therefrom, which was introduced and popularized by Metchnikoff, has had a somewhat varied career. The original ideas of Metchnikoff concerning *B. bulgaricus* have been largely discounted, yet to him must be given the credit of having started a practice and a series of studies which seem now to have reached a definite conclusion and which have substantially confirmed his general opinion.

The use of sour milk in one form or another is general over large parts of the world and goes back into the earliest history of man. The Bible mentions "soured milk" as one of the foods given to the Jews by Jehovah. Whenever we find such general use of a food extending over so many hundreds of years, there is almost certain to be some foundational reason for it.

While many good results have been reported from the use of *B. bulgaricus*, particularly in children and in old people suffering from intestinal troubles, it has been conclusively shown that it is impossible to implant this organism in the human intestine. They disappear entirely in the course of two weeks at most, although fed in large quantities. Apparently greater success attends the efforts to implant the *B. acidophilus* and it can always be removed from the dejecta during feeding periods.

In the actual treatment of cases there is considerable evidence to show the beneficial effect of milk curdle by the *B. acidophilus*. The two conditions in which it seems to be of especial value are constipation, and diarrhea due to intestinal putrefaction. During the administration of the germ, there is a transformation of the intestinal flora from the proteolytic to an aciduric type, which is dominated by the *B. acidophilus*. The effects are specific to that germ since sterile milk does not produce the same effect, nor does pasteurized acidophilus milk, nor does acidophilus milk when centrifuged and run through a germ proof filter. In other words, the germ as well as its products must be present to produce the good effects.

From a practical standpoint, it has been shown that preparations of such milk do not keep well longer than from 3 to 4 days, and are preferably kept at room temperature instead of the refrigerator, since cold causes the death of many organisms. After 3 days in an ordinary icebox the number of living germs is reduced approximately 90 per cent.

While the author has had considerable experience practically and in the laboratory with *B. acidophilus*, and while he is a very strong advocate of its proper use, he warns us against the idea that it is a panacea for all ills of the flesh, and there is no guarantee that its use will prolong life to the extent that Metchnikoff hoped.

An appendix gives directions for the preparation of acidophilus milk for ordinary use, as well as on a large scale. Directions for analysis of the feces are also given.

The book is excellently printed and well illustrated. It contains many charts showing experimental treatment of various conditions. The bibliography gives 186 well selected references, and the book is completed by a good index. It is a notable contribution to our knowledge on this interesting topic, valuable to the bacteriologist as well as to the general practitioner.

Since milk in any form is such an important factor in our dietary, the book possesses a wide interest for all who are interested in nutrition as affecting public health. M. P. RAVENEL

Elementary Morphology and Physiology for Medical Students: *A guide for the first year and a stepping-stone for the second— By J. H. Woodger. New York: Oxford University Press,* 1924. xii+528 pp., 255 figs. Price, $4.20.

This work has been written for the medical student in England whose biological training is incorporated in his medical course. It covers the conventional subjects with freshness and vigor and embodies a number of exceptionally good new illustrations. The chapters on science and medicine, on the method of science, and on the relations of mind and body are such as to invite meditation. The omission of the insects and the absence of eugenics are to be regretted and the failure to utilize more fully the pathogenic Protozoa is a serious defect. The complete segregation of morphology, and physiology from pathology in biological instruction so well illustrated in this and other treatises is deterrent to medical progress. Biological instruction for all purposes is in need of the synthesis of these fields at the very foundation of biological thinking. C. A. KOFOID

Lead Poisoning—*By J. C. Aub, L. T. Fairhall, A. S. Minot, and P. Reznikoff. Medical Monographs, VII. Baltimore: Williams & Wilkins Company*, 1925. 265 pp. Price, $4.

This monograph presents the results of exhaustive and admirably planned studies conducted at the Harvard Medical School with funds contributed by the National Lead Institute. It discusses the subject under 4 headings, Chemistry, Pathology, Physiology and Clinical Facts.

Under the first heading the chromate method of estimating the amount of lead present in organic materials is described as the most reliable procedure available. There follows a discussion of the psysico-chemical behavior of lead compounds which brings out among other things the marked solubility of lead oxide and metallic lead in blood serum, a point of much importance in its bearing on the absorption of lead through the lungs. It is next shown that lead is transported in the blood stream in the form of colloidal lead phosphate and deposited in the bone tissue as tertiary lead phosphate, to remain there until local increases in acidity transform the tri-lead salt to di-lead phosphate.

The author's present evidence to show that the respiratory tract is in general the route by which lead enters the organism most rapidly, so that the exposure to be most guarded against is the inhalation of finely divided particles, continued ingestion coming next as a source of danger. Bones are the principal, and, in fact, almost the only organs in which extensive and lasting storage of lead takes place although immediately after absorption from the intestinal tract the liver may temporarily contain a high concentration. The lead in the bones is harmless as long as it remains there, but hyperacidity may easily cause its release with damaging results to other tissues.

The section on pathology contains little or nothing that is new. It presents, however, an excellent summary of the literature and a peculiarly valuable summary of pathological findings: (a) found constantly due to lead; (b) found frequently due to lead; (c) seen frequently in people with evidences of lead absorption, and (d) reported to occur occasionally in people with evidence of lead absorption or possibly due to lead.

The section on physiology begins with an exhaustive and highly suggestive analysis of the action of lead upon the blood cells bringing out the fundamental changes in permeability due to lead salts and interpreting the stippling which is the first and most characteristic indication of lead absorption as a definite result of injury to the blood cells. The lead line which is held to be the second constant symptom is due of course to the reaction of lead in the circulation with hydrogen sulphide derived from decaying material in the mouth. Lead colic is attributed to direct inhibition of the motility of smooth muscle, and an increase in its tone and lead palsy is similarly interpreted as primarily an effect upon muscles rather than nerves.

The clinical section emphasizes 4 signs as most frequently apparent during the early stages of the disease: (a) the ashen color of the skin; (b) the lead line on the gums; (c) stippling of the red blood cells; (d) a mild secondary anemia. Under treatment the authors recommend the immobilization of lead in the bones during severe intoxication, by ingestion of ample calcium, while after the acute toxic episodes have passed elimination of lead may be cautiously accelerated by a low calcium intake, acids and their ammonium salts, sodium bicarbonate and potassium iodide. The beneficial effect of milk is held to be due to its dietary properties rather than to its effect on the absorption of lead.

The only sentence in the whole volume with which the reviewer feels inclined to take exception is the statement that "with proper precautions it should be possible to control lead poisoning completely and thus avoid the need of eliminating the use of lead in industry." So far as certain types of industrial use of lead are concerned this statement seems a little over-optimistic.

The volume in hand will no doubt contribute materially, however, toward such an ideal and in the opinion of the reviewer it is perhaps the most important single contribution made in the history of American industrial hygiene.

C.-E. A. WINSLOW

Precis de Pathologie Exotique—*Par A. Le-Dantec (Paris, Gaston Doin)*, 1924. (Ed. 4), Vol. 1, 942 pp., 102 figs. in text; Vol. 2, 1232 pp., 184 figs. in text. Price, 75 francs.

This is the fourth edition of a well known treatise in the Collection Testut from the pen of the Professor of Colonial Medicine and Exotic Diseases in the Medical School at Bordeaux. The first section deals with climatology in relation to success and failure in colonization. The author attributes the increased mor-

tality of Europeans in the warmer parts of the world to diseases endemic therein. This is, or once was, strikingly true of pernicious malaria. Tuberculosis, so quickly fatal to whites in the American tropics, seems less prevalent in Africa, and less often attacks the bones and joints. The second part is devoted to tropical diseases. Naturally a large section (278 pages) is devoted to the malarial fevers and to black water fever. The author is convinced that a combination of quininization and protection against mosquitoes is most effective in the reduction of the incidence of malaria, where the former can be made general for the whole population. He inclines against the view that quinine is concerned with black water fever, because of its occurrence among natives among whom this drug was not used, and its absence in some cases where it was extensively used. He seems to favor its relation to anaphylaxis. The discussion of African trypanosomiases is exceptionally complete and up-to-date alike for the etiological factor, preventive measures and treatment, including Bayer 205. Cholera, yellow fever, and plague are discussed fully, especially with reference to shipping and quarantine. The French law (1921) and the international sanitary convention (1912) on the control of these epidemics are both presented. A closing section is devoted to diseases of cold countries. This book is marked by encyclopedic completeness and French precision.

C. A. KOFOID

Evolution, Genetics and Eugenics — *By Horatio Hackett Newman, Professor of Zoölogy, University of Chicago. Chicago: University of Chicago Press,* 1925. 639 pp. Price, $3.50.

Just as the second edition of this book comes to hand the daily papers announce the passage of a law through one branch of the state legislature of Mississippi prohibiting the teaching of evolution. The need of such a book and the desirability of its wide circulation are evident.

Published first in 1921, it went through 6 impressions in 3 years, and the second edition appeared in December, 1925. That it was needed to supply a want is evident from its history. The author states that it is an effort to give an orderly account of the various phases of evolutionary biology in one volume of moderate size. It is made up largely of extracts of varying length beginning with the works of classic writers and coming down to those who are to-day contributing articles on the amazing revelations which experimental work is bringing forward. Wherever necessary the author has supplied chapters and explanations welding the matter into a homogeneous whole. While prepared primarily as a text book for college use, Professor Newman has not forgotten the general reader who has had no especial training along the lines of this specialty.

The book is particularly valuable in that a distinct effort has been made to show that evolution and religion are entirely compatible and that one can be a Christian and still believe in evolution. Clear definitions are given in the first chapter of what evolution really is and what it is not. In view of the enormous amount of discussion which has gone on over evolution, one might suppose that the general public would have a clear idea of what was being discussed, yet we find the most preposterous statements being constantly made by those who profess to know something about the subject.

In looking over the names of the authors from whose writings extracts have been made one is convinced of the authority of the book and that the author has selected his material from those men of all others best able to speak convincingly and authoritatively.

The author was one of the scientists who went to Dayton, Tennessee, as a witness in the Scopes trial. A special chapter has been written in which an account of this trial and its significance in relation to the anti-evolutionary campaign which threatens the entire United States is clearly discussed.

The book consists of 5 parts; the first is introductory and historical; the second discusses the evidences of evolution; the third the causal factors involved; the fourth genetics; and the fifth eugenics. There is an excellent bibliography and a glossary defining the terms used, which is a great help to those not specialists in this field.

While the book has been adopted and used for teaching purposes quite widely, the present reviewer only ventures to speak of its value for the general reader, and for those who like himself believe that the explanation of many facts connected with our well being from the public health standpoint may eventually be found in a clear understanding of where we have come from and the processes through which we have passed in our progress. The book lacks the charm and human interest which

is so evident in all the writings of Thompson, for example, and in some places would be benefited by a smoothing process. However, on the whole it is clear and easily understood, giving to the seeker after truth an excellent exposition of the subjects enumerated in a form requiring only a single volume which does not burden one to read. M. P. RAVENEL

Dental **Infections, Oral and Systemic**—*By Weston A. Price, D.D.S., M.S., F.A.C.D. Two volumes, not sold separately. Cleveland: The Penton Publishing Company.* 703 pp. and 471 pp. Price, $20.00.

The growing recognition of the importance of dental infections on the general health, makes this monumental work of practical interest, while its character gives it more authority than any other book on the subject of which we know. It is the largest, most complete, most scientific and most important single contribution to the subject which has come to our attention.

The book is in two volumes—the first of which is devoted to researches on the oral and systemic expressions of dental infections, and the second to researches on the clinical expressions of dental infections. In volumes so full of detail, and of new presentations of old facts, as well as newer findings, it is difficult to select the more important ones for review. The books do not lend themselves readily to review, since they are in the nature of a series of essays, each chapter being headed with a "Problem" which is announced as a subheading, and ending with "Summary and Conclusions," based on the evidence which has been brought forward. These are preëminently fair, and in very few instances is there any indication that the author is riding a hobby which he sees verified in every experiment. Indeed at times we would be glad if he drew more positive conclusions from his experiments, but one cannot but admire the fairness and balance exhibited by the author, who has spent 25 years in obtaining his results.

Animal experimentations on a large scale have been carried out. While the author recognizes the value of X-ray in the diagnosis of dental infections, he points out the danger of depending entirely upon the radiograph in estimating the degree of infection. Very convincing photographs are given in conjunction with radiographs to show that a bony ridge on the outside of the jaw will give a shadow which may be mistaken for bone absorption. The same thing is true of overlying teeth or of a superficial layer of condensing osteitis. He considers the granuloma found in the rarefied areas a defensive membrane protecting the body against local infections, a "periapical quarantine." A large area of rarefaction may indicate strong defense, and contrariwise, its absence may point to a more dangerous condition. He feels that it is possible in most cases to determine with fair accuracy the degree of defense in individual cases, and holds that the presence of apical rarefaction does not necessarily mean the condemnation of a tooth. Of practical interest is the evidence given that teeth contain substances other than bacteria which are frequently toxic and against which individuals may become sensitized, and this anaphylactic sensitization, which brings about disturbances in the skin, mucous membranes of the nose and throat, of the digestive tract, of the air passages, and other tissues, may be entirely removed by correction of the dental infection.

The second volume is on the same high plane as the first. The author cites cases, not in large numbers but worked out in detail, giving the dental condition, the results of animal inoculation, combined with the description of the lesion and the general condition of patients together with studies of the blood before and after treatment, an ideal method of investigating dental infections as possible causes of systemic disease. While we may not at the present time be able to accept all of the author's conclusions, there can be no question of the value of his methods as well as his results.

The book is well printed in large type and profusely illustrated by plates in color, reproductions of radiographs and photographs, and charts, all of which are of unusual excellence.

The book deserves a more complete review, even in a journal devoted to public health and not to dentistry. We regret that its size and cost will limit its circulation and usefulness, but it must find a place in all general libraries, as well as in the private libraries of those who wish to keep in touch with the advances in this very important branch of medical and surgical science. We cannot but commend the enthusiasm and persistence of the man who is willing to spend, as he tells us in the preface, more than $250,000 out of his own earnings on the science to which he is devoted.

M. P. RAVENEL

HEALTH DEPARTMENT REPORTS

IRA V. HISCOCK

United States Public Health Service—World health conditions are reviewed in the annual report of the Surgeon General of the United States Public Health Service for the year ending June 30, 1925. Surgeon General Cumming repeats the warning he gave last year as to the danger of the lowering of standards of health in the United States, which may possibly result from overconfidence and relaxation in the vigilance of public health work. He also points out the fact that a material increase in the population produces a marked tendency to a more than corresponding increase in sickness and death, and states that this increase will surely follow unless rational proportionate measures are enforced to prevent it. The people of the United States, in so far as the national health is concerned, have grown into a body-compact comparable to the human body, no part of which can suffer without affecting the well being of all. With the coöperation of the state departments, state and local health authorities, and other agencies, the Public Health Service has developed a comprehensive system for the collection of world statistics of diseases, which, the Surgeon General says, however, is capable of much greater development.

The most important event in the field of international health relations during the fiscal year was the signing of the Pan-American Sanitary Code by 18 of the American Republic at Havana, Cuba, November 14, 1924. This pact provides for the collection and distribution of information concerning the prevalence of communicable disease and prescribes the standardization of measures necessary to prevent their transmission from one country to another. It is noted that there was no importation of plague, cholera, or yellow fever, or of other major quarantinable diseases during the year, though both human and rodent plagues were detected on vessels arriving at quarantine. For almost the first time in the history of United States quarantine there was no detention of ships' passengers or crews on account of yellow fever. "In spite of the fact that the means for preventing smallpox is well known, this disease continues to be widespread and destructive." The warning issued by the Surgeon General in 1924, regarding the menace of smallpox in the United States proved amply justified, since reports from 35 states for the calendar year 1924 show an increase of 75 per cent in the number of cases, and 62.8 per cent in the number of deaths as compared with the year 1923. The smallpox case-rate in the United States is at present, according to reports received, the highest of any civilized country in the world. Efforts are being made to induce physicians to follow a standard technic when vaccinating, and warnings were issued against using shields and bunion pads as dressings.

General health conditions in the United States continue good. Preliminary figures indicate a total death rate for the calendar year 1924 of 11.9 per 1,000 as compared with 12.4 in 1923, with 17.6 in the registration area in 1900 and 19.8 in 1880. Birth rates in 25 states show an increase from 22.3 per 1,000 population in 1923 to 22.5 in 1924. The rates vary from 31.6 in North Carolina to 16.1 in Montana. A reduction in the number of deaths of infants under one year of age per 1,000 births, from 77.7 in 1923 to 71.9 in 1924 is recorded. Little change, however, is apparent in the number of deaths of mothers as a result of causes incident to childbirth during the last 9 years for which data are available. For over 100,000 live babies born during that period from 600 to 900 mothers' lives were sacrificed. About one-third of these deaths were caused by infection of the mothers at childbirth.

Attention is called to the increasing number of deaths and injuries from automobiles; to the fact that heart disease ranks first in the United States as a cause of death; and to the fact that little progress has been made in the control of whooping cough during the last 25 years. Half of the deaths caused by whooping cough occurred in children under 1 year of age, and 94 per cent in those under 5 years of age. The education of parents in regard to the extreme danger of whooping cough in very young children is strongly advocated. A study of the vital statistics from 1900 to 1923 shows a marked increase in the number of deaths caused by cancer in the original registration states. During the same period the death rate from diabetes is almost doubled.

An account is given of the effort being made

to unify measures for the safeguarding of milk, the importance of which product as a food cannot be overestimated. Studies in child hygiene have continued to emphasize the importance of correction of abnormal conditions found at the school age, such as defective vision and teeth, diseased tonsils and adenoids. It has been estimated that sickness causes the child to be absent 4 per cent of the possible days of school attendance, the common cold being the most frequent cause of absenteeism. Other important investigations noted by the Public Health Service were: (1) the extensive prevalence of typhoid fever in certain cities during 1924–1925; (2) goiter, (3) drug addiction and its relation to crime, (4) nutrition, (5) sanocrysin, and (6) industrial hygiene. The latter investigations included research of the manufacturing and use of tetra-ethyl lead. A campaign for the control of venereal diseases was continued along the line of the threefold plan of educational measures, legal measures, and medical measures. An office was also established for the purpose of supplying health officers with information on current practices in their line of work. This endeavor is allied with the continued study of municipal health department activities.

Cleveland, Ohio—The division of health of the city of Cleveland has recently published a 56-page statistical report covering the years 1916–1924 inclusive. The records have been compiled by chiefs of several of the administrative bureaus of the division from the data compiled by the statisticians of the Cleveland Health Council and from the federal census of 1920. From the first table it is noted that Cleveland's population has steadily increased during the period 1900–1920, and that in comparison with 20 other large cities has grown in population rank from 8th to 5th place. Interesting tables are presented showing the amount of money appropriated for general operating expenses of the city over a long period of years, as well as a financial statement of all money appropriated from tax funds expended by the health division 1894–1924 inclusive. This city of an estimated population of 912,502 in 1924 expended through its health division $504,098.

A general death rate of 10.18 per 1,000 population is recorded for the year 1924 and this is the lowest rate yet noted for this city. The infant mortality rate for the years 1916–1924 has shown a rapid decline from 105.4 to 66.2. An interesting table showing diphtheria morbidity and mortality for the years 1890–1924 inclusive, indicates a steady decline during this period in the death rate from this disease from 102.7 per 100,000 population to 8.7 together with a decrease in case mortality from 35 per cent to 7.2 per cent.

Los Angeles, California—Several features of interest to health administrators are contained in the report of the department of health of Los Angeles for the year ending June 30, 1925. This 75-page report consists of the introductory report of the health commissioner addressed to the mayor and city council followed by special reports from the directors of divisions, and concludes with a detailed financial statement and other important tabular material with a classified index. A detailed mortality table, prepared in accordance with the International List of Causes of Death and classified by broad age groups, sex, race, and social status, is appended to the report. Special tribute is paid the former health commissioner, Dr. Luther M. Powers, who served the city in that capacity for a long period.

The city has been divided and sub-divided into many districts with employes stationed at each district to act as health officers of that particular territory. Miniature health departments have been established in three districts. It is stated that the old practice of stationing guards around houses where there has been smallpox has been practically discontinued with a saving during the past year of approximately $50,000 over the amount expended in 1923 for this purpose. A triplicate set of records is kept in the various offices, saving considerable time of the inspectors, while pin point maps containing complete information as to districts are kept by each division of the city health department, and each morning these maps are brought up to date. The city covers an area of 15 square miles and has an estimated local population of 1,200,000 people. The total expenditures by the health department for the year amounted to $595,355.

The report of the quarantine division indicates that the outstanding feature in the work of this division during the year was the appearance and subsequent quarantine of 37 cases of pneumonic and bubonic plague. The contacts and suspected contacts were all placed under the most rigid isolation. There were 31 cases of pneumonic plague and 29 deaths, 6 cases of

bubonic plague and 4 deaths. "To the early diagnosis, to the laboratory confirmation, and to the fact that the General Hospital is so well equipped to care for an emergency of that sort, we are indebted for the saving of the city of Los Angeles from the ravages of an epidemic of this plague." An active rodent extermination campaign was undertaken and has been continued to prevent a repetition of the appearance of this disease.

During the year there were 19,124 live births and 1,223 deaths of infants under one year of age, 599 of these deaths occurring under one month of age. A crude death rate of 11.29 per 1,000 population is recorded. The continued reduction in the infant mortality rate is attributed among other things to an increasing interest by the general public and physicians in its cause and methods of prevention, together with the work being done in infant welfare by the health department which supervised the individual care and feeding of more than 8,000 infants. The mortality of infants being supervised by this service is considerably less than one-third of the infant mortality rate for the city as a whole. It is interesting to note that nursing service under official auspices has developed constantly since 1898, when the city council appropriated $50 a month for the support of a nurse.

One of the most interesting of the special reports is that of the Maternity Division, providing a systematic program of prenatal and obstetrical care. Resident physicians to the number of ten are maintained in addition to attending obstetricians and consultants. Maternity dispensaries provide for those not able to pay for medical supervision through pregnancy regardless of whether the patient is to be delivered by the Service or at the General Hospital or similar institution. Patients are required to go to the dispensary every two weeks throughout pregnancy. A routine Wassermann is done on every new case, blood pressures are taken and urinalyses are made in addition to the other routine measures taken in an organization of this character. Social service and nursing service are also provided. A summary of the reports for the past ten years record: 14,155 applications for service, 7,285 women delivered, 80,122 prenatal and postpartum house calls, and 40,950 dispensary visits. The cost of maintaining this service has increased from $4.93 per application in 1917, to more than $7.77 in 1923. This cost includes care throughout pregnancy, at the time of the delivery, and after care. It does not include nursing care. The report as a whole has been carefully prepared and is well printed in readable type. It is bound in attractive light green paper covers.

United States Army—The report of the Surgeon General of the United States Army for the fiscal year ending June 30, 1925, contains a fund of information for those interested in the measures employed and the results obtained by the medical department of the Army in the prevention of disease and in the maintenance of health. The report is also worthy of study by those who have occasion to employ statistical methods in the form of tables, graphs, and charts, as aids in the presentation of data on a large scale. The logical arrangement and the clearness and conciseness of expression in the discussion of data, are noteworthy features.

The health of the Army as measured by admissions (cases) from disease (535.45 per 1,000 per year) has never been better. The death rate in 1924 (3.83) was the lowest ever recorded in the history of the Army. Relatively greater progress has been made in the prevention of deaths from disease than from external causes. The total cost of running general hospitals, including repairs to buildings with such slight additional construction as was done, and the maintenance of roads, walks, and drives, was $4.95 per patient per day. This was a reduction of 33 cents below the cost during the previous year. The respiratory group of diseases including influenza, the pneumonias, bad colds, and sore throats, etc. (31.5 per cent of all diseases treated), was, as heretofore, numerically the most important cause of admission. As stated in a recent number of the *Military Surgeon*, the continual practical elimination of both typhoid fever and smallpox from the military personnel should be sufficient evidence to convince even the most ardent anti-vaccinationist, if he were open to conviction, of the efficiency of the vaccination against these two diseases.

Dayton, Ohio—The eighth annual report of the Division of Health, Department of Public Welfare, Dayton, for the year 1925 is published in the Health Bulletin of January 15, 1926. At the beginning of the report there is a chart which represents the organization of the division of health and shows how coöperating agencies are associated with the official

association in public health work. The venereal disease clinic, for example, is financed by the community chest and the city of Dayton, and the board of education finances the medical work in the public schools. The Visiting Nurse Association employs 12 nurses including a supervisor and her three assistants. The city pays the salaries of 13 nurses. The Public Health League maintains the tuberculosis clinic and pays the physician, while the nursing and follow-up work are done by the district nurses. All these activities are joined with the other public health work in the bureau of medical service as a single unit. The health commissioner serves under the director of public welfare who in turn is responsible to the city manager and city commissioner.

The report is illustrated by several instructive graphs and tables and one photograph of a nurse teaching a class in home nursing at one of the high schools. The infant mortality rate has decreased from 124 per 1,000 living births in 1913 to 51.7 in 1925. A general death rate of 11.2 per 1,000 population is recorded. Dayton now has 23 districts in the city with a nurse in each district. Two nurses are on duty at the health clinic for venereal diseases and four student nurses come for six week periods on half time duty for field experience in public health. In 1925 this staff made 61,446 calls. In this city, the control is centralized; the same director supervises the nurses of the health department and the visiting nurse association and offices are furnished by the health department.

Lowell, Massachusetts—The forty-seventh annual report of the board of health of Lowell for the year 1924 consists of 84 pages of text and tabular material, well printed in readable type and bound in light brown covers. The city seal adds to the attractiveness of the front cover and title page. The organization of the board of health and of the health department is set forth on the introductory pages.

The report of the board of health to the mayor and members of the municipal council records a crude death rate of 13.7 per 1,000 population (based on a population of 112,759), which is lower than that for 1923 by 1.2 per 1,000. Deaths of infants under one year of age numbered 175, representing an infant mortality rate of 91 per 1,000 live births, which is probably the lowest infant mortality rate ever recorded for the city. Deaths of children from one to five years of age in 1924 showed a marked decrease over the previous year.

The report of the subdivision on school hygiene states that 19,508 pupils were examined by physicians while 26,081 pupils were inspected by nurses. A total of 17,924 defects were found by physicians among the children examined and 16,366 notices of defects were sent to parents. A total of 6,451 hygiene talks were given in the schools. The expenditures of the health department for the year amounted to $189,404, of which $63,395 were expended for the maintenance of the isolation hospital, and $23,128 for the division of school hygiene.

Colombo—The 1924 report of the medical officer of health of Colombo is divided into two main parts, the first dealing with vital statistics, and the second with administration. An introductory note calls attention to the fact that 1924 was an exceptionally wet year with a total rainfall of 122.39 inches, 39.42 inches above the average. The birth rate of 27.2 was higher than the decennial average of 26.4. A crude death rate of 29.3 per 1,000 population, as against 35.5 in 1923, was recorded. This was calculated on an estimated population of 253,226.

The death rate from phthisis was 269 per 100,000 population as compared with 296 in 1911. Next to pneumonia this is the chief cause of death in Colombo. A progressive improvement in the infant mortality rate during the last 20 years is noted, but the rate in 1924 was 239 as compared with an average of 254 for 1917–1923, of 280 for 1910–1916, of 342 for 1903–1909, and of 400 for 1896–1902. The municipal council realizing the importance of the infant welfare problem, is extending operations by the development of an up-to-date child welfare scheme, with a woman assistant medical officer of health in charge of this branch of work.

One of the best features of the report is the abundance of excellent graphs indicative of disease and mortality trends, maps of the city showing infant mortality rates by electoral and sanitary wards, spot maps of phthisis cases, plague, and other important data. An unusual but non-fatal outbreak of food poisoning, as a result of infection of ice cream by *B. suipestifer*, is reported.

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PUBLIC HEALTH NOTES

Pennsylvania Association of Dairy and Milk Inspectors Meets—At the second annual convention of the Pennsylvania Association of Dairy and Milk Inspectors held in Harrisburg, Pennsylvania, January 19–20, the following officers were elected: President, Thomas W. Henderson, Secretary of Board of Health and Milk Inspector, Washington, Pa.; First Vice-President, Dr. John W. Rice, Bucknell University, Lewisburg, Pa.; Second Vice-President, Dr. W. F. Davison, President of Board of Health, Kingston, Pa.; Secretary-Treasurer, W. W. White, Pennsylvania State Department of Health, Harrisburg, Pa.

There were 110 inspectors and other health workers in attendance. In his paper on "The Handling of Milk as a Public Health Measure," Dr. W. G. Trumbull, Deputy Secretary of Health, emphatically stated "The medical examination of milk handlers is worth while but not a full protection. We need better laboratory control."

In his report for the Committee on Communicable Disease, Dr. J. F. Shigley, assistant professor of veterinary medicine, Pennsylvania State College, gave a brief history of epidemics occurring in Pennsylvania in 1925. The committee traced four epidemics of typhoid fever and one of homolytic streptococcus infection with many typhoid cases to dairy farms.

Dr. N. C. Craig, Washington, D. C., read a paper on "How Washington Prepared and Passed a Milk Ordinance."

Other speakers on the program included: Dr. J. W. Kellogg, Director, Bureau of Food and Chemistry, Department of Agriculture, Harrisburg, who spoke on laws recently passed by the legislature; Dr. S. E. Bruner, Director, Division of Tuberculosis Eradication, Bureau of Animal Industry, Harrisburg, Pa.; R. E. Irwin, Chief, Division of Milk Control, Pennsylvania State Department of Health; R. E. Van Cise, Superintendent of Production, Dairymen's League Coöperative Association, New York City; Dr. John W. Rice, Bucknell University, Lewisburg, Pa.; R. U. Blasingame, professor of farm machinery, Pennsylvania State College; W. J. Lewis, Milk Inspector, Oil City, Pa.; William T. Johnson, Associate Bacteriologist, United States Department of Agriculture; Dr. G. W. Grim, Milk Control officer, Milk Control District No. 1, Ardmore, Pa.; C. R. Hostetter, Milk Inspector, Palmerton, Pa.; E. Grant Lants, instructor of farm machinery, Pennsylvania State College; H. C. Fetterolf, Assistant Director, Department of Public Instruction, Harrisburg, Pa.; James N. Lightner, Legal Inspector, Pennsylvania Department of Health; R. D. Snyder, Manager Snyder Dairy Company, Bloomsburg, Pa.; Samuel Youngman, Milk Inspector, Williamsport, Pa.; C. I. Cohee, of Philadelphia Interstate Dairy Council.

The Fourth Sedgwick Memorial Lecture—The Fourth Sedgwick Memorial Lecture was delivered at Kensington Hall, Boston, Mass., on the afternoon of Friday, February 12, by Dr. Chas. D. Chapin, Superintendent of Health of Providence, R. I. President S. W. Stratton of the Massachusetts Institute of Technology introduced the speaker to a highly representative audience of past students and friends of Professor Sedgwick and the leading health officials of New England.

Dr. Chapin's subject was "The Variability of Smallpox and Scarlet Fever." He discussed first of all the historic development of the mild form of smallpox frequently known as alastrim, and showed that it has preserved its identity unchanged for a quarter of a century and is no doubt due to an organism which has arisen by mutation from the germ of classical smallpox. In the case of scarlet fever Dr. Chapin believes that the changes which have taken place are more in the nature of gradual fluctuating variation, and by an analysis of fatality rates for this disease of various parts of the world over a period of 50 years he showed a steady and gradual decrease in virulence in all countries where isolation has been effectively practiced. Dr. Chapin arrived at the important conclusion that although it is doubtful whether isolation as currently practiced has materially diminished the incidence of the disease, it is highly probable on the other hand that it has

operated through natural selection to substantially diminish its virulence by eliminating the more severe form of the disease due to the more virulent strains of the parasite.

New Publication—A new periodical, *Stain Technology*, made its appearance in January. The initial issue contains 48 pages, 6" x 9", and is very readable, printed on glazed paper with a few illustrations. This publication, to be a quarterly, is issued under the editorship of Dr. H. J. Conn and apparently under the auspices of the Commission on Standardization of Biological Stains.

The first issue contains a brief history of the commission, its constitution, and list of members. The articles are:

"Standardization of Biological Stains as a Problem of the Medical Department of Army," R. W. French

"The Oxidation Products of Methylene Blue," W. C. Holmes and R. W. French

"Inhibitory Properties of Anilin Dyes," John W. Churchman

"Crystal Violet and Erythrosin in Plant Anatomy," Gemma Jackson

"Staining Protozoa with Janus Green B," M. J. Hogue

"Fuchsin and Picro-indigo-carmine, a Polychromatic Stain for Vertebrate Organogeny," Waldo Shumway

"A Technic for Preparing Frozen Sections," Leon S. Lippincott

"Basic fuchsin as an indicator of Endo's Medium," Eliza F. Genung

Rural Community Hospitals Established by Commonwealth Fund—The construction of rural community hospitals is a new project announced by the Commonwealth Fund, New York City. The first of these hospitals will be constructed at Farmville, Va. To carry out its project, which involves the construction of two hospitals a year, the Commonwealth Fund has made an initial appropriation of $350,000 for the building of the first two hospitals. Fifty rural communities applied for the first hospital. Farmville was selected following a study made by Henry C. Wright, hospital consultant and former deputy commissioner of the New York City Department of Public Welfare. James Gamble Rogers and Henry C. Pelton are preparing plans for this first unit.

A Division of Rural Hospitals under direction of H. J. Southmayd, formerly hospital consultant to the Cleveland Welfare Federation, has been established in connection with this new project to receive applications from rural communities. To the community selected the Fund contributes two-thirds of the cost and equipment of the hospital, and the community must pledge one-third. The community is also obligated to meet the operating and maintenance costs.

In announcing this project the following statement is made:

That rural communities, despite certain natural advantages, frequently afford a less satisfactory opportunity for healthful living than many of our cities; that the infant mortality rate in New York City, for example, is lower than for the state at large and that similar conditions exist elsewhere.

The causes of such conditions are admittedly numerous and complex. Lack of a sufficient number of competent physicians in rural communities is undoubtedly a contributing factor which itself has many causes. In all the discussion of the subject, however, there appears one outstanding fact upon which all may agree. In many rural communities the physician finds little professional incentive either to establish himself or to remain. Lack of facilities with which to work, absence of stimulus and of means to improve both knowledge and technique drive many physicians to more promising and progressive locations.

Among the most important needs in many such communities is that of a modern and well-equipped hospital. Lack of reasonably available hospital facilities often means retarded medical progress. It has meant also that the numerous allied activities which a good hospital stimulates and of which it is the center, such as out-patient clinics, education of the people along health lines, adequate control of communicable diseases and sanitary control generally have developed slowly and less effectively; and the value of the hospital as an educational force among the physicians, with all the attendant advantages to both physician and community, has been greatly missed. It is hoped that this new work may help to improve conditions of rural medical practice.

LABORATORY

C. C. YOUNG*

Preparation of Silver Nitrate Ampules for Treatment of Eyes of Infants at Birth**—Michigan law requires every physician, nurse or midwife in attendance at a birth to administer to the eyes of every infant within one hour after birth a prophylaxis approved by the Michigan Department of Health.

This department has named and approved as such prophylaxis one drop of 1 per cent silver nitrate solution.

Prior to January 1, 1924, the department had not distributed the silver nitrate solution free for this prophylaxis. It was then deemed advisable to make available to practicing physicians and midwives a satisfactory outfit for administering the silver nitrate solution. The purchase, in the open market, of the wax ampules filled with silver nitrate was investigated and found to be too expensive. Following the suggestion of Mr. Fred Berry of the Ohio State Department of Health, experiments were carried on which were so promising that equipment was designed and built and experiments made which demonstrated that the ampules could be manufactured during the spare time of laboratory workers at very little expense. The cost of manufacturing and distributing 100,000 ampules was $243.07 without labor charge. As the work was used for a pick-up during slack days in the laboratory, this is the net expenditure of the State Department of Health. The total cost including labor and a 10 per cent safety factor for waste added

FIGURE I. DIPPING SPINDLES TO FORM AMPULES

* Each month we desire to publish in the LABORATORY NOTES short, original articles, under the author's name, dealing with some phase of applied bacteriology, labor saving devices, modified methods, etc. Contributions should be in the hands of associate editor before the 15th of each month.—C. C. YOUNG, Department of Health, Lansing, Mich.

** *Public Health*, Mich. State Dept. of Health, Sept., 1924.

FIGURE II. REMOVING AMPULES FROM SPINDLES

makes the total actual cost of 100,000 ampules, boxed, 4 ampules to a box, in envelopes ready for mailing, $465.37, or $4.57 per 1,000.

The preparation of ampules is accomplished in six steps. The wax is melted in a constant level bath and maintained at a temperature of 55° C. by thermostatic control. Sixteen racks, each carrying 20 tapered brass spindles, were provided. There are 4 additional spindles, ¼ inch longer than the other spindles, attached to each corner of the rack so that the 20 spindles do not touch the bottom of the bath. First the spindles are oiled with cotton seed oil, each spindle being wiped off with billiard cloth which is saturated with oil. The racks are then dipped in the wax until the long spindles touch bottom; raised; the film allowed to congeal; and then dipped again. The dipping is repeated until there are eight coats of wax on the spindles. This gives an ampule with a wall about 1/32 inch thick. The ampules are then removed from the spindle as illustrated in Figure II and stored until we are ready to fill. It is our usual custom to make ampules one day and fill and seal them at another time.

The next three steps in the procedure must necessarily be grouped together. The silver nitrate solution is dispensed from a tubulated bottle into the ampules by a multiple tip burette as illustrated in Figure III. The receiving blocks for the ampules are made out of cast aluminum and the holes drilled with the same taper as the ampules so that the ampules stand perpendicular to the plane of the block. With very little practice, the operator of the burette can fill the ampules half full with one opening of the pinchcock. From the burette the blocks are slid under the closing device shown in

Cost of 100,000 Silver Nitrate Ampules

Bees wax, 75 lbs., $.41 per lb.	$30.75
Paraffin, 48°, 25 lbs., $.045 per lb.	1.12
Needles, 25,000, $.72 per 1,000	18.00
Boxes, 25,000, $6.00 per 1,000	150.00
Gummed labels, 16 rolls, $.70 per roll	11.20
Printed instructions, 25,000, $.10 per 100	25.00
Silver nitrate solution	7.00
Materials cost	$243.07
Three people can make and fill 5,000 ampules in an 8 hour day at $3.00 per day per person = $9.00 for 5,000. 20 days at $9.00 per day	180.00
Materials and labor	$423.07
Plus 10 per cent for waste	42.30
	$465.37

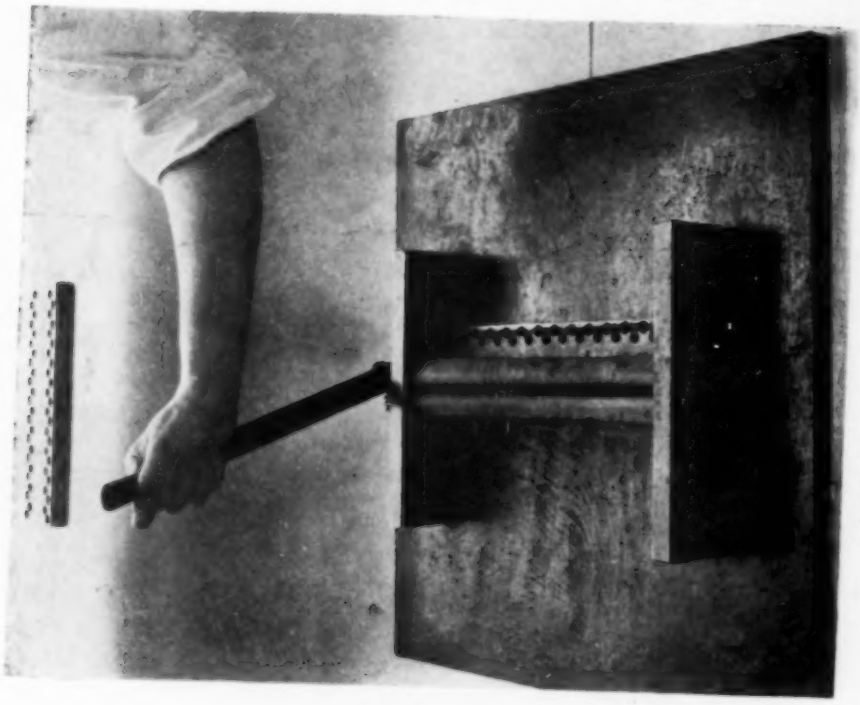

FIGURE IV. OPERATING CLOSING DEVICE

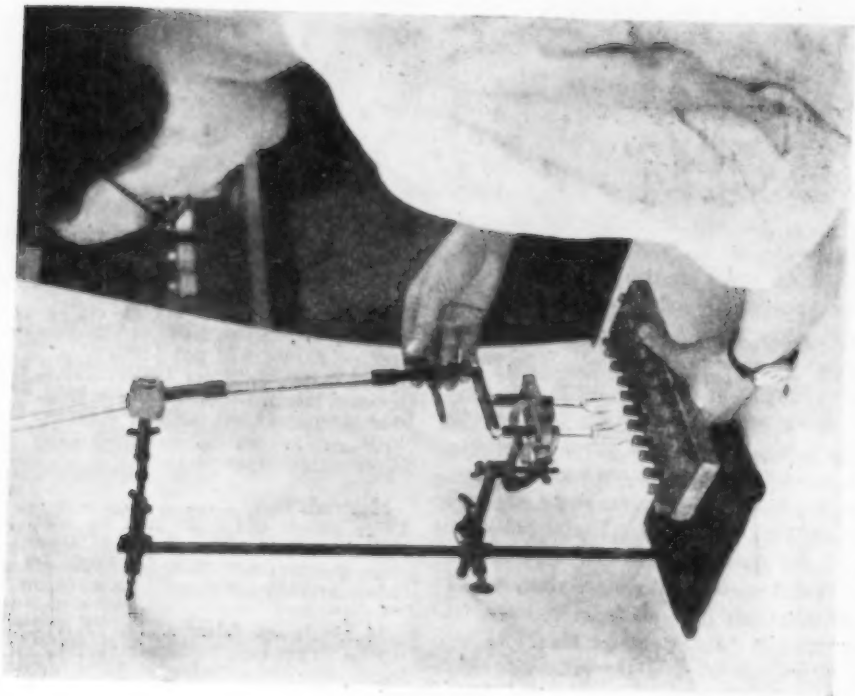

FIGURE III. FILLING AMPULES

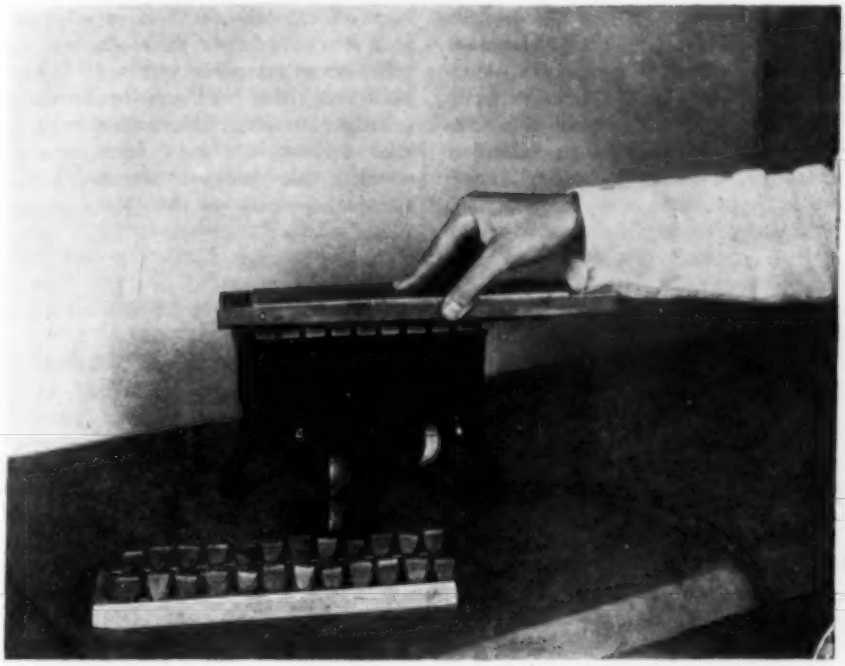

FIGURE V. SEALING AMPULES

Figure IV. This is geared at the lever end so that the rubber covered bars pinch the tips of the ampules together as shown in the right hand row of ampules. From the closing device they are moved to the jog shown in Figure V, inverted over a hot plate and the top of the ampules touched to the hot surface which sizes them and seals them at the same time. The sealed ampules are then shaken in a large tin can with talc to coat the outside so that they will not stick together. These are then stored in bulk until such time as it is necessary for us to fill boxes for supplying the demand. The box is sent through the mails in manila envelopes.

SIX MONTHS' EXPERIENCE IN DISTRIBUTING AMPULES

There has been practically no loss due to crushing of the boxes in the mails. Properly sealed ampules show no loss of evaporation and no deterioration in the strength of the silver nitrate solution. Ampules kept at body temperature for 6 months show no loss by evaporation or change in strength of the silver nitrate solution. Ampules kept at icebox temperature, if warmed up to body temperature carefully before used as an eye dropper, show no deterioration in plasticity of the wax. As we have gained experience in the preparation of these ampules, fewer have been thrown out on inspection at the time of filling the boxes. There is no difficulty in picking out the leaky ampules as the silver nitrate solution shows black streaks in the talc coating.

CONCLUSION

From the standpoint of the laboratory executive this is one of the most satisfactory ways of using the spare time that necessarily arises from varying mail receipts of specimens, as the work can be started or stopped at any point in a very few minutes.

Simple Method for Plating Mixed Cultures—Since the employment of semi-solid culture media in plates, numerous methods have been devised to secure an equal distribution of colonies. Each method described has its advantages and disadvantages, but with the use of a small bead or buckshot, a perfect distribution can be made with ease. A simple method that will produce results can be carried on as follows:

A quantity of beads (2 to 2½ mm. in diameter, preferably glass, although buckshot can be used) are placed in a small well stoppered bottle to which is added a sufficient quantity of 65 per cent alcohol to cover the beads for the purpose of bringing about sterilization. For convenience, a platinum loop of proper size, bent at right angle, can be used as a vehicle in transferring the bead to a flame (to burn off alcohol) thence to a mixed culture. It is then placed upon the media in a plate and rolled about a number of times. If a dilution is desired, the bead can be transferred to another plate, etc. This method has been used with success in plating feces, pus, sputum, water, and mixed cultures.—W. Arnold Gunther, Coöperative Laboratory, Cumberland, Maryland.

VITAL STATISTICS

LOUIS I. DUBLIN, PH.D.

Principal Causes of Death, U. S. Registration Area, 1924—The Department of Commerce announces that 1,173,990 deaths occurred in 1924 within the death registration area of the United States, representing a death rate of 11.9 per 1,000 population as compared with 12.3 in 1923, 11.8 in 1922 and 11.6 in 1921. The death registration area in 1924 comprised 39 states, the District of Columbia and 18 cities in non-registration states, with a total estimated population on July 1 of 99,030,494, or 88.4 per cent of the estimated population of the United States. The decrease in the rates from influenza, from 44.7 per 100,000 population in 1923 to 19.6 in 1924, and from pneumonia all forms from 109 to 98.4 accounts for nearly three-fourths of the decrease in the rate from all causes. Some of the other causes for which the rates decreased are measles, diphtheria, diarrhea and enteritis (under 2 years) and tuberculosis all forms. Slight increases appear in the death rates from diseases of the heart, cancer, and automobile accidents.—Dept. of Commerce, Washington, D. C., Dec. 28, 1925.

Vital Statistics in Columbus, O., 1925—The death rate in Columbus for 1925 was 13.8, an increase of .7 over 1924, while the birth rate was 20, a decrease of 1.1 per 1,000. Deaths from influenza, pneumonia, heart disease, enteritis and traffic accidents showed the greatest increase over the totals for 1924. The causes of death which showed decreases are diphtheria, cancer, Bright's disease, diabetes and suicides. Diseases of the heart, cancer, tuberculosis, lobar pneumonia and Bright's disease took the greatest toll of persons.—*Columbus Dispatch*, Jan. 3, 1926.

Vital Statistics, Detroit, 1925—Detroit's 1925 death rate is the lowest in the history of the city, being 10.9 per 1,000, based upon a population of 1,242,000, the figure obtained from the census made last spring. Prior to this year the lowest rate was 11 in 1921; for 1924, it was 11.4, while in 1900 it was 16.3. The rate has shown a steady decrease during the past quarter century. If the rate of 1900 had prevailed for 1925, it would have meant the death of 5,000 people who are still alive. The birth rate was 26.1, which is slightly lower than the figure of 27 for 1924. Detroit's highest birth rate occurred in 1916, when it was 33.4. The infant mortality was 78.8. The 1924 and 1925 infant mortality rates are the lowest the city has ever experienced. The diphtheria death rate shows a remarkable decrease, from 371 in 1920, 205 in 1923 to 162 in 1924 and 120 in 1925. The 1925 death rate from tuberculosis (90.7) is the lowest on record, representing a decrease of 10 over the previous year. The typhoid fever death rate is also the lowest in the history of the city, being 2.6.—*Detroit Free Press*, Dec. 31, 1925.

Prevalence of Notifiable Disease in States in 1924—The U. S. Public Health Service reports the number of chickenpox cases in 46 states, including District of Columbia, to have been 197,541 in 1924, the rate being 1.82 per 1,000. This may be compared with 1.33, the average for 1922 and 1923. The case rate for diphtheria in 46 states and the District of Columbia was 1.07 as compared with 1.34, the estimated expectancy based on the years 1917–1923, a most favorable decrease. Measles, however, showed a case incidence of 4.72 which

was nearly twice that expected, 2.96. Poliomyelitis was also epidemic in 1924, 36 states and District of Columbia having a case rate of 0.058 as compared with 0.024 in 1917–1923. Scarlet fever and smallpox were somewhat above normal, there being 1.66 cases per 1,000 for scarlet fever as compared with 1.29, the expected rate, and 0.49 for smallpox as compared with 0.35, the expected rate. Typhoid fever and whooping cough showed practically normal rates—.33 and 1.38 respectively.—*Pub. Health Rep.*, 40:2741–2745 (Dec. 18), 1925.

Vital Statistics, England and Wales, Third Quarter of 1925—A further decrease in the birth rate and an increase in infant mortality are recorded in the Registrar General's quarterly return of births, marriages and deaths in England and Wales, for the third quarter of 1925. The births registered in the third quarter correspond to an annual rate of 18.6 per 1,000 of the estimated mid-year population for 1924. This rate is 0.5 per 1,000 below that recorded in the corresponding quarter of 1924, and was the lowest birth rate recorded in any third quarter except during the years 1917–1919. The deaths correspond to an annual rate of 9.7 per 1,000, being 0.5 above that recorded during the third quarter of last year. Influenza was stated to be the primary or contributory cause of deaths in 582 cases or 0.6 per cent of the total deaths. The infant mortality was 62 per 1,000 births, this being 9 above the rate for the third quarter of 1924, but 10 below the average of the 10 preceding third quarters.—*Med. Off.*, 34:236 (Nov. 28), 1925.

Vital Statistics for the Third Quarter of 1925 in Northern Ireland—During the quarter ended September 30, 1925, 7,124 births were registered in the 27 Superintendent Registrars' Districts in Northern Ireland, this number being equivalent to an annual birth rate of 22.2. The population of Northern Ireland in 1925 is estimated to be 1,281,000. This rate may be compared with 18.6 in England for the third quarter of 1925 and with 20.8 for the same period in Scotland. The deaths numbered 3,858, representing an annual rate of 12.0 per 1,000. The death rates of Scotland and England and Wales for the period are much lower, being 10.9 and 9.7 respectively. The death rate from cancer was 107 per 100,000 as compared with 97 for the average of the third quarters, 1920–1924, and that from tuberculous disease 149 as compared with 151 for the 5 preceding quarters. —*Quart. Return of the Marriages, Births and Deaths, Northern Ireland, 3rd Quarter*, No. 15.

Health in the Unfederated Malay States—In Johore the estimated population for 1924 was 317,317. The death rate was 26.07 and the birth rate 38.75. The infant mortality was 182.9 as compared with 196.28 in 1923. There were 3 cases of plague and 2 of cerebrospinal meningitis, all fatal; 29 cases of chickenpox and 205 of measles (including German measles) were reported. Of smallpox there were 8 cases, all of which recovered; of influenzal pneumonia 6 cases with 4 deaths; 58 cases of enteric fever with 16 deaths; 1,798 cases of ankylostomiasis with 68 deaths; 677 cases of beri-beri with 63 deaths, and 1,810 of dysentery and diarrhea with 215 deaths. Twelve thousand five hundred and fourteen cases of malarial fever were treated in government and state hospitals. Four hundred and forty-six deaths were registered as due to phthisis.

In Kelatan the total population was 309,300, of whom 286,363 were Malays. There were about 12,000 Chinese and 6,000 or so Siamese. The main ailments treated at the native hospital at Kota Bharu were malaria, syphilis, yaws, beri-beri and phthisis. A special hookworm campaign was carried out in Ulu Kelantan. There was one fatal case of cholera. The health on estates was good.—*Lancet*, 2:1207 (Dec. 5), 1925.

The Health of Venezuela—The nature of the soil in Venezuela favors the outbreak and rapid spread of the diseases which attack man. Situated between 2° and 12° latitude north and possessing many rivers, this country is most propitious to the spread of malaria which, in its endemic form, is rife in these parts. All varieties of climate are to be found. In the hot districts on the coast and on the plain the maximum temperature is 35° C. and in the mountainous snow covered regions, the thermometer varies from 0° to 20° C. The most common diseases and those which are responsible for the highest mortality rates in Venezuela are malaria, tuberculosis and other intestinal diseases, tetanus, chiefly infantile, and typhoid fever. Tuberculosis has assumed alarming proportions in this country. The large proportion of gastrointestinal affections is chiefly due to two causes, namely intestinal parasites, principally hookworm, and enteritis

in children. The large number of tetanus deaths is due mainly to the ignorance of antiseptics especially with regard to newborn babes. As soon as the thickly populated centers become immune from malaria (as is the case in Caracas where endemic malaria has completely disappeared) typhoid fever takes its place and spreads automatically as the population increases. It is clearly shown that the high death rate from preventable diseases is caused by impure water, mosquitoes and flies, by the ignorance of the people and by the undernourishment of children. The government and voluntary health agencies are gradually beginning to make their efforts felt.—F. A. Risquez, *World's Health*, 6:489–495 (Dec.), 1925.

Health of the Philippines—The present population of the Philippines is estimated at 11,067,000. During the year 1923 the marriage rate was 13.3, the birth rate 34.8 and the death rate 18.3 per 1,000 of population. For the 5 years ending in 1922 the average marriage rate was 14.1, the birth rate was 33.7 and the death rate 25.2. Contrasting earlier death rates with these, in 1903 the death rate was 43.2; in 1918 it was as high as 36.3; and in 1922 but 18.9. There has thus been a progressive lowering of the death rate, while the birth rate has practically remained the same. The reduction in the death rate is, however, largely the result of very decided diminution of infant mortality, which was 263 per 1,000 births in 1918 but only 148 in 1923. This cannot be considered excessive for a native population in the tropics.

Details for particular diseases are still more impressive. In 1919 there were 49,971 deaths from smallpox while in 1923 there were only 4 deaths from this disease. In 1919 there were 18,213 deaths from cholera, in 1923 only 11. The 1918 death rate from typhoid fever was 44.2 per 100,000, the 1923 rate 18.3. Dysentery declined from 195.6 in 1919 to 64.7 in 1923. This reduction has been the result of active sanitary efforts, including immunization campaigns against smallpox, cholera and typhoid.

Considering Manila separately, the death rate for the 5 years ending 1922 had been 29.2. During 1923 the rate was reduced to 26.0. The local death rate is considerably increased by non-residents because of local hospital facilities. The infant mortality is very high, being 192 in 1923, although it has been reduced in recent years. The outstanding mortality factor is tuberculosis, which contributed 21 per cent of all the deaths in 1923. Cancer, however, took a toll of but 35.7 deaths per 100,000.

Important problems in the Philippines are leprosy, yaws, hookworm, typhoid fever, dysentery and malaria. Most of these diseases are receiving the proper attention.—F. L. Hoffman, *Spectator*, 115:31, 33 (Dec. 17), 1925.

Bright's Disease Mortality—The Bright's disease mortality rate of American cities reached a maximum in 1916–1917 or just about previous to the enactment of national prohibition. It is, therefore, a reasonably safe inference that the nation-wide curtailment in drinking habits has had much to do with the decline in the mortality from this disease from 106.9 in the group of about 60 cities in 1917 to 80.6 in 1924. In the death registration area the death rate from Bright's disease was 78.9 in 1922 as against 82.4 for 1921. In the registration states of 1900 the mortality from acute and chronic nephritis combined increased from 88.7 per 100,000 in 1900 to 107.7 in 1910, declining to 98.3 in 1920.

Nephritis is a disease of advanced adult life. In 1920 the rates by age groups are as follows: 14.5 per 100,000, under 5; 5.8, ages 5 to 9; 7.2 at 10 to 14; 9.4 at 15 to 19; 12.9 at 20 to 24; 21.0 at 25 to 34; 47.7 at 34 to 44; 119.1 at 45 to 54; 284.2 at 55 to 64; 701.5 at 65 to 74 and 1598.2 at 75 and over. The relative importance of Bright's disease as a cause of death in adult life is seen in the fact that at ages 45 to 54 in 1920 the rate per 100,000 was 30.0 for diabetes, 84.2 for cerebral hemorrhage, 119.1 for acute and chronic nephritis, 164.7 for organic diseases of the heart and 173.8 for cancer.

The mortality for males, taking all ages together, exceeds that for females, the 1920 adjusted rates having been 90.8 for males and 83.8 for females. Race appears to have an influence on the death rate and practically everywhere the colored mortality rate from nephritis is in excess of that for the white population.

When a large number of individual cities are observed, a wide variation in rates is noted. Of 58 cities in 1910–1914 the rates ranged from 9.6 in McKeesport, Pa., to 270.1 in Mobile, with an average rate of 100.2. In 1915–1919 the range was from 3.8 in McKeesport to 242.5 in Petersburg, Va., with an average rate of 99.5. In 1920–1924 Mobile, Ala., had the highest rate, 220.2, and the average rate was 81.7.—F. L. Hoffman, *Spectator*, 115:35–37 (Nov. 26), 1925.

INDUSTRIAL HYGIENE

EMERY R. HAYHURST, M.D.*

Workmen's Compensation Laws in Ohio—Among the many interesting features of this paper is reference to the constitutional amendment adopted in the state which authorizes the Industrial Commission to take from the State Insurance Fund an amount, not to exceed 1 per cent of the total premiums collected each year, to expend in the work of accident and occupational disease prevention. By these provisions more than $100,000 a year becomes available for industrial safety work. A corps of expert safety engineers will be possible who are capable of doing practical and educational work along lines of a higher standard than heretofore. This service will not supplant the present factory inspection service but will supplement it. Dependence upon legislative appropriations would never make it possible to establish such a safety department. At the present rate of compensation in Ohio, 15 death claims in which there is full dependency will amount to $100,000. Thus if this work should be the means of saving 15 lives it will reimburse the State Insurance Fund for the full amount expended, to say nothing of the pain, sorrow, and misery, from which many individuals will be saved.—T. J. Duffy, Chairman, Ohio Industrial Commission, *Bull. No. 389*, U. S. Bur. of Labor Statistics, 1925, p. 39.

State Laws Needed to Compensate All Occupational Diseases—Recent developments have shown the futility of the "specific schedule" method of adequately compensating occupational diseases. Official approval of the all-inclusive method is steadily growing in various states. Newer forms of occupational poisons have recently aroused public interest because they were incompensable. The ultimate goal is a stimulus to disease prevention similar to that which has taken place following accident compensation laws. The present discredited schedule plan adopted in New York state 4 years ago was foisted on the state by opponents of adequate health for labor. Its results have been almost negligible. Five cases of girls who died in New Jersey from poisoning while painting illuminated figures on watch dials were not compensable since such an affliction was not included in the "list" of occupational diseases. There is no reasonable excuse for delaying longer in extending all state workmen's compensation laws to protect all wage earners against all diseases arising out of their employment as they are now protected against accidental injuries. A worker incapacitated by occupational disease should receive compensation just the same as one who is injured by accident. Correct measures add but little to the total compensation burden of the individual employer, but to the individual victim of an occupational disease it is a much needed and wholly justified relief.—John B. Andrews, *Am. Labor Legis. Rev.*, XV, 4:316 (Dec.), 1925.

Occupational Disease Compensation—Sickness costs yearly three-quarters of a billion dollars among industrial workers in the United States in addition to waste of well-being and efficiency. One-fourth of this amount, or about $200,000,000, can be prevented. The most effective aid in the absence of health insurance laws, lies in the inclusion of occupational diseases in compensation laws. Without such laws, safety and health inspectors are deprived of their greatest aid in promoting industrial hygiene. There have been two plans of compensation for occupational diseases. The first plan as early adopted by Massachusetts and now accepted by seven other states covers all occupational diseases by striking out the word "accident" and redefining "injury" so as to include occupational diseases. Here all the value of workmen's compensation can be brought to bear immediately upon prevention and thus assist industrial inspectors in their safety work. The second plan which followed the opposition of special interests to workmen's health insurance was the

* The editor of this Section will gladly receive contributions from members. Please address all communications to Hartman-Ohio Bldg., Columbus, O.

creation of a scheduled list of diseases for compensation. Four states, Illinois, Minnesota, New Jersey and Ohio, followed New York in adopting this method which has resulted in such meager ends that not over a dozen occupational-disease awards were made in New York during an entire year, although 50,000 accidental injuries were compensated. This plan is narrow and misleading. A possible exception is found in Ohio where there are extensive lead manufacturers, where dermatitis is included, and where there is an exclusive state fund with more liberal interpretations than usual. (The paper next considers the number of occupational diseases and their percentage relationship to accidents as reported in the various states.) Comparable costs and time-loss figures are not given in some of the leading states. It is concluded that the general or inclusive type of law covering all "personal injuries" is preferable to the narrow specific-list law. The public has been less misled into believing the increased compensation for occupational diseases would be vastly expensive, but under the most liberal laws they do not amount to more than 2 to 3 per cent of accident costs. Great improvement is needed in record keeping of occupational diseases. (A valuable discussion follows.) —John B. Andrews, Secretary, Am. Assoc. for Labor Legis., *Bull. No. 389*, U. S. Bur. of Labor Statistics, 1925, p. 42.

Annual Report of Occupational Diseases in Ohio—During the year ending June 30, 1925, there were reported in Ohio the following occupational disease claims for compensation: lead poisoning 172, arsenic 1, benzol 6, dermatitis 464, brass 5, unclassified 100; and, by self-insurers, to June 25, 1925: lead poisoning 118, benzol 3, dermatitis 316, compressed air illness 1, carbon dioxide 2, brass 4, unclassified 99. The report shows the months in which cases have occurred, the number of special hearings regarding them, the number of deaths, and the comparison with previous years.—*4th Annual Report*, State Dept. of Indust. Relations, Columbus, O., June 30, 1925.

New Occupational Diseases from Radioactive Substances—This is the leading article of a recent issue of the *Journal of the A. M. A.* Case citations, illustrations, and tables are given. The authors describe a hitherto unrecognized form of occupational poisoning. The anemia present is actually proved to be due to the ingestion of radioactive elements which have produced exhaustion of the blood forming tissues. Necrosis of the jaw bones is the local type of injury produced, complicated by increased bacterial action. It is believed this is the first time that radioactivity has been demonstrated in the human body during life by means of electrometers. In the organs after death the presence of radium, mesothorium and their decayed products were found in the lungs of a chemist and physicist who had died of an acute leukopenic anemia of the pernicious type. The electroscope or electrometer demonstrated radioactivity in the expired air of the victims. In one individual, even after 4 years, a large amount of emanations in the exhaled breath was demonstrable. After radio elements are once deposited in the body there is no known way of eliminating them. It takes radium 1,750 years and mesothorium 6.7 years to reach one-half of their original activity. Five known deaths have occurred. It would appear that intravenous injections of radioactive substances are also highly dangerous except the short lived emanations.—Martland, Conlon and Knef, *Jour. A. M. A.*, 85, 23:1769 (Dec. 5), 1925.

Factory Inspection in Great Britain in 1924—A very complete summary of the annual report of the Chief Factory Inspector of Great Britain is to be found in the November issue of the *International Labor Review*. About half of the report is devoted to occupational diseases. Briefly, there were 711 reported cases including 61 deaths. Lead poisoning accounts for 486 cases and 32 deaths, in addition to 88 cases of poisoning and 10 deaths among house painters and plumbers not covered by the Acts. A continued increase in lead cases was noted in the manufacture of electric accumulators, also in ship-breaking where work with the acetylene flame is done. There was a marked increase in cancerous ulcerations in cotton textile works (mule spinning). There was an increased number of outbreaks of dermatitis, principally among handlers of dyestuffs and intermediates, also among handlers of alkalis, caustics and acids. The Wool Disinfecting Station at Liverpool, of which a history is given, is said to have prevented any cases of anthrax from East Indian goat hair or Egyptian wool. Forty-six cases from other sources, especially hides and skins, were reported with 4 deaths. Carbon monoxide caused 107 cases

and 10 deaths. Gases and fumes caused 216 cases and 19 fatalities. A marked reduction occurred in cases due to benzol, naphtha and aniline—from 55 to 26 cases. The manufacture of artificial silk showed poisoning by H_2S in some 22 spinners examined. The investigation of dusty trades has resulted in directions for general ventilation and local exhaust, particularly in pottery works and likewise in cotton works. Handling grain cargoes necessitates suitable exhaust for the removal of dust. During the year, the certifying surgeons examined 364,297 young persons for admission to employment. They rejected 10,410, and of this number 6,491 were rejected exclusively for medical reasons. In addition 8,530 cases were given certificates subject to the fulfillment of specified conditions on medical grounds. Many other features are also covered in this summary.—*Internat. Labor Rev.*, XII, 5:689 (Nov.), 1925.

Fumes from Soldering Stoves—There is considerable controversy over the providing of hoods for soldering stoves. The writer made tests for lead dust in discharges from such stoves. The first room contained 200 soldering stoves. A sample of deposit from a small flue from a hood 2 feet above the stove contained 7.12 per cent lead. The air in the same room was found to contain 0.053 milligrams lead per cubic meter. In another room containing 80 soldering stoves there were no hoods or exhaust systems. The natural ventilation was unusually good however. There was also a 36 inch propellor fan in one of the windows. The air at one end of the room showed 0.20 milligrams of lead per cubic meter and at the other end 0.05 milligrams. A sample of dust deposited on a lamp shade 4 feet above the soldering benches showed 9.0 per cent, and another sample 4.0 per cent. These tests demonstrate the necessity for good ventilation at the soldering stove, although the amounts of lead found were very small so far as the air analyses went.—C. M. Salls, *Indust. Hyg. Bull.*, N. Y. State Dept. of Labor, Albany, 2, 6 (Dec.), 1925.

Gas Hazards in Street Manholes—The atmosphere in 15 manholes in Pittsburgh and 12 in Philadelphia, suspected of being gaseous, were tested. Some of the holes contained city gas which had leaked in. The natural gas distributed at Pittsburgh is non-poisonous, provided no artificial gas is added, but large volumes may suffocate workers in unventilated manholes by displacing the air. Such accidents have happened. The manufactured gas in Philadelphia is high in carbon monoxide. Thorough ventilation is therefore required to insure safety to workers. A hand operated rotary blower, similar to a forge blower, with canvas pipe leading to the bottom of the manhole is serviceable. Actual tests in manholes showed very dangerous amounts of CO. Explosive gas mixtures were also found in one hole at Pittsburgh and two at Philadelphia. The hose mask is recommended for use in manholes when respiratory protection is necessary.—Katz, Meiter and Bloomfield, *Serial No. 2710*, U. S. Bur. of Mines, Oct., 1925.

Venesection and Blood Transfusion in Carbon Monoxide Poisoning—The author reports six cases of (alleged) carbon monoxide poisoning which occurred during the war when 10 men were in an old German dug-out at the time the side was blown in by a shell. The dug-out was set on fire. Four of the men brought to the casualty clearing station were almost black as to lips and ears with a dirty earthy color of the skin; two were deep dusky red. There was no marked respiratory distress. Little effect was produced by oxygen. The two worst cases were transfused with marked benefit. The blood had the same characters in all—thick, black, tanny, flowing from the veins with difficulty and clotting at once. The urine showed a biliary tinge. None showed any nervous manifestations, the reflexes were normal, and no paralytic symptoms were observed. All the men extricated themselves from the fire, the severe symptoms coming on later. The author states that the two surprising features of the cases were (1) that so dark a skin color developed without respiratory distress, and (2) that cherry red color of the blood was not a feature. Short case histories are given.—Sir Gordon-Watson, *Brit. Med. J.*, 3388:1049 (Dec. 5), 1925.

Calcium and Tuberculosis—The writer's thesis, prepared under the supervision of Dr. Henry Field Smyth at the University of Pennsylvania, comprehended the influence of an inspired dust on a specific infection of the lungs. The conclusion drawn is that calcium hydrate dust is not harmful to the lungs of rabbits. This is attributed to its physical and chemical

nature by which it has roundness of particles (preventing injury) and is soluble in the body fluids. When inoculated with tubercle bacilli there seems to be a retardation in the development of the disease. When lime dusting occurs after inoculation with tubercle bacilli, there is more distinct retardation of the disease. Excess calcium dust must be deposited, apparently, in the bones, kidneys and lungs. In the tuberculous condition where we have a calcium demineralization, any increase in calcium would tend to balance the deficiency and permit of an approach to normal.—Miriam S. Iszard, *J. Indust. Hyg.*, 7, 11:505 (Nov.), 1925.

An Investigation into the Health of Textile Mill Workers—This is a comprehensive summary of an investigation made under the instruction of the Director-General of Public Health begun November 20, 1923, and ending February, 1924. It covered the physical examination of 106 males and 166 females in three mills and a series of inspections of temperatures and Kata-thermometer readings through eight mills in the vicinity of Sydney. Of the men examined, 40 per cent possessed a normal state of health; 22 per cent had renal disease, 8 per cent nose and throat disease, and 5 per cent heart disease. The 67 analyses of the examinations of the women showed many afflictions. [These the article does not summarize. The investigation concerning air movement and dust hazards seems to have been complete and scientific and is accompanied with numerous tables which should be especially consulted by those interested in this type of industrial work.]—Charles Badham, *Report of the Director-General of Public Health, New South Wales*, Sydney, 1923, price 7s. 3d.

Blood Transfusion in Carbon Monoxide Poisoning—The author thinks that Sir Charles Gordon-Watson (see above article) was mistaken in his diagnosis of carbon monoxide poisoning in the six above cases. If the men were so poisoned, the poisoning could not have been serious so far as carbon monoxide was concerned, "as they were all able to escape by their own efforts, and it was only later, at the clearing station that the severe symptoms appeared." Sir Gordon-Watson suggests some other agent may have been partly responsible for these later symptoms, but this other agent must have been wholly responsible. The extraordinary dark color and the manner in which the symptoms increased in severity are inconsistent with carbon monoxide poisoning. The absence of lung symptoms and the failure of pure oxygen to bring improvement seem to exclude the theory that any lung-irritant gas, such as phosgene or nitrous fumes, was responsible. The blood signs were evidently due to methemoglobin or similar product incapable of transporting oxygen from the lungs. Nitrites or dinitrobenzol are known to produce symptoms exactly similar to those described. A guess is that the cases were nitrite poisoning from the ammonol of the Mills bombs used. There was every indication for transfusion, however, in the two cases described, but there is none in cases of carbon monoxide poisoning because this poisoning is eliminated fairly quickly from the blood, where respiration is maintained.

The very severe symptoms remaining after carbon monoxide poisoning are not due to existing shortage of oxygen but are after-effects of prior shortage of oxygen. Neither transfusion nor administration of oxygen can be expected to have any good effect in such cases. Oxygen containing 5 per cent of carbon dioxide, as recommended by Yandell Henderson, will greatly hasten the elimination of CO and thus avert serious after-effects.—J. S. Haldane, *Brit. Med. J.*, 3389:1146 (Dec. 12), 1925.

In the next issue of the *British Medical Journal* (Dec. 19, 1925, p. 1199) Sir Gordon-Watson acknowledges that these cases should be labeled methemoglobin poisoning and that Dr. Haldane's letter throws considerable light on the cases which he reported under the heading of CO poisoning. He feels, however, that early venesection and blood transfusion might reduce the severity of the after-effects in direct proportion to the duration of time, especially as an emergency measure, and compared with oxygen containing 5 per cent carbon dioxide, perhaps not available as in a closed garage case. [He fails to mention, however, anything concerning artificial respiration under such circumstances.—Abstractor.]

FOOD AND DRUGS

HARRY W. REDFIELD, PH.D.

Cystine in the Nutrition of the Growing Rat—To determine whether cystine is a limiting factor in growth on a diet the protein of which is furnished by milk alone, young rats were placed at weaning on a basal diet of whole milk powder diluted with about five times its weight of starch, together with common salt and with yeast, butterfat, cystine, or ferric citrate as a supplement.

On the basal diet alone (cornstarch 81.97, whole milk powder 16.39, and sodium chloride 1.64 per cent) and on all the other diets except the one furnishing yeast, growth soon ceased, but was renewed after the addition of yeast, thus indicating vitamin B to be the first limiting factor. The subsequent growth was below normal in all of the rats except those receiving cystine, in which growth was rapid. In a second series, similar to the first except that 1 per cent of calcium carbonate was added to the rations, growth was again more rapid with the cystine. The calcium carbonate appeared to be without effect.

It is concluded that cystine is the first limiting amino acid of the proteins of cow's milk for the growth of young rats.—H. C. Sherman and A. T. Merrill, *J. Biol. Chem.*, 63, 2:331–337, 1925.

Mineral Deficiencies of Milk as Shown by Growth and Fertility of White Rats—This is the complete report of a long continued investigation of the nutritive value of milk, the outcome of an earlier study on the deficiencies of heated milk. The general plan of the investigation was to supplement milk with various organic and inorganic substances and to carry on feeding experiments with rats through several generations if possible, noting the number and viability of the young.

Of the many substances tested, soy bean powder or its ash was the first to correct the deficiency in the milk with respect to reproduction. With the addition of from 7 to 10 gm. of the powder to 1 liter of milk, young in the first generation were obtained at 13 weeks and succeeding litters were successfully raised. Equally good results were obtained by the addition to quickly boiled milk of starch paste containing a mixture of aluminum potassium sulfate ($AlK(SO_4)_2 12H_2O$), sodium fluoride (NaF), sodium silicate (Na_2SiO_3), and manganese sulfate ($MnSO_4 4H_2O$) in such a proportion that each animal received daily 1.5 mg. of each salt. To every 200 c.c. of milk 1 drop of a 2 per cent solution of sodium iodide and 3 drops of a saturated solution of iron citrate were also added. The salts when used alone or in combination of 2 and 3 were less effective than the mixture of salts, and the addition of all of them to a purified ration made to simulate milk was without effect on reproduction.

It is concluded that if vitamin X is essential to physiological processes it is contained in milk in sufficient quantity for growth and reproduction, and that the deficiencies in milk are rather of a mineral nature.—A. L. Daniels and M. K. Hutton, *J. Biol. Chem.*, 63, 1:143–156, 1925.

Reproductive Potency of Dry Milk as Affected by Oxidation—Milk powder containing 12 per cent of fat was packed in hermetically sealed cans (1) containing air, (2) containing carbon dioxide, and (3) containing a deoxygenated substance, and after nearly two years was used in feeding experiments with rats as part of a ration consisting of casein 18, salt mixture 4, agar 2, yeast 3 per cent, and dextrin to make up 100 per cent with the varying proportions of the milk powder which furnished 11.7, 17.5, 23.3, and 35 per cent of the ration. These amounts were equivalent to 1.4, 2.1, 2.8, and 4.2 per cent of butterfat.

With the rats fed the air-packed or CO_2-packed powders there was no reproduction on any of the amounts of milk powder fed. With the powder stored in deoxygenated air there was one instance of reproduction on amounts as low as 11.7 per cent, slightly better on the intermediate amounts, and normal reproduction and rearing through the weaning period on the largest amount. Of the same kind of milk

powder stored under ordinary conditions for about 7 months, 41.7 per cent was required to duplicate the results obtained with 35 per cent of milk powder held for 2 years in deoxygenated air. This amount had a butterfat equivalent of 4.2 per cent. When butterfat prepared under ordinary conditions was used in place of the butterfat of the dried milk, young were produced and reared on 5 per cent butterfat, but the young were not vigorous. On 2 per cent of cod liver oil there was no reproduction.

"The data recorded in this preliminary report do not permit definite statements regarding all prerequisites necessary for successful reproduction. The interpretation of the results can not be construed as tending to disprove the existence of a distinct reproductive factor X, nor, in the light of present knowledge, do they necessarily tend to corroborate the existence of a factor. If further investigations should prove beyond doubt the existence of a distinct vitamin necessary for reproduction, it is apparent from our data that this factor is readily susceptible to oxidation in the condition in which it exists in dry milk. On the other hand, if the destructive oxidative changes should prove to have been limited merely to the quantitative reduction in potency of vitamin A, it would appear that the marginal requirements of this vitamin necessary for successful reproduction are greater than heretofore appreciated."—G. C. Supplee and O. D. Dow, *J. Biol. Chem.*, 63, 1:103–114, 1925.

Dietary Requirements for Reproduction—IV. Solubility of the reproductive dietary complex (vitamin E) in various organic solvents—In this continuation of the investigation previously noted, evidence is presented that the factor E, which is essential for reproduction, is soluble in benzene and acetone as well as ether.

In feeding experiments in which wheat embryo from which the greater part of the oil had been removed by extraction with acetone or benzene was used as a source of vitamin E, fertility was secured but the young were not reared, showing that the extracted embryo was insufficient for lactation. The success in fertility is attributed to the small amount of residual oil left in the embryo after extraction. In this connection attention is called to the work of Mattill, Carman, and Clayton in which failure at reproduction was secured with wheat embryo extracted for from 24 to 36 hours with anhydrous ether and to previous work of Evans in which the conclusion was drawn that fat-free embryo is as effective a galactogogue as whole wheat embryo. It is considered probable that in the former case the wheat embryo had been more completely freed from oil than in the latter, and that the difference in results is due to traces of oil.—B. Sure, *J. Biol. Chem.*, 63, 2:211–223, 1925.

Composition of the Diet and Vitamin B—By experiments similar to ones previously noted, it is considered to be demonstrated that the metabolism of proteins requires less vitamin B than that of carbohydrates.—(Trans. title), C. Funk, J. A. Collazo, and J. Kaczmarek, *Compt. rend. Soc. de biol.*, 92, 12:997–998, 1925.

Vitamins in Canned Foods—II. The Vitamin C Destructive Factor in Apples—The data would indicate that apples canned after treatment with salt solution, as is common practice in the commercial canning of apples, do not lose their vitamin C irrespective of the time of processing within the limits of commercial practice, and that such canned apples are richer in vitamin C than fresh apples which have been held for some time in cold storage.—E. F. Kohman, W. H. Eddy, and V. Carlsson, *J. Indust. & Engin. Chem.*, 16, 12: 1261–1263, 1924.

The Influence of Storage on the Antiscurvy Value of Fruits and Vegetable Juices—This is the complete report of an investigation which has been noted from a preliminary report by Davey. The earlier results with fresh fruits and fruit juices stored for a considerable period of time are again reported, together with the results obtained with the same materials after storage for about 5 years. The investigations also extended to swede juice.

The whole fruits, oranges and lemons, and the swede roots appeared to retain their antiscorbutic value when kept in cold storage as long as the material remained in good condition. Orange and lemon juices stored for 5 years in a frozen condition retained about half of their original antiscorbutic property, but swede juice became almost inactive after 15 months. Oranges canned by heating gradually to 100° C. and holding at this temperature for 5 minutes, the whole process occupying from 20 to 30 minutes, showed no loss of antiscorbutic property when first canned and only a

slight decrease in activity after 4 years. As compared with raw juice stored in the frozen condition, storage at laboratory temperature after canning as above appeared to be a more efficient means of protecting the antiscorbutic value. Tomato juice canned, as noted in a previous paper, was less stable than canned oranges.

Lemon juice preserved with potassium bisulfite retained its flavor well after storage for 4½ years at laboratory temperature, but during this period lost about five-sixths of its antiscorbutic value. Orange and lemon juice preserved in rind oil retained their activity after from 1 to 3 years.—E. M. Delf, *Biochem. J.*, 19, 1:141–152, 1925.

Irradiated Foods and Irradiated Organic Compounds: Therapeutic Possibilities—In addition to a concise summary, with references to the original literature, of previous work on the impartation of anti-rachitic properties to foods and certain chemical compounds by irradiation, data are reported on the calcium balances in two infants following the addition to their ordinary diet of 5 c.c. daily of olive oil at first untreated and later irradiated for 30 minutes. In the first subject the calcium retention increased from 0.047 gm. per kilogram daily on the untreated oil to 0.061 gm. on the treated oil and in the second from 0.059 to 0.065 gm. The effect of the irradiated oil is said to be of the same order as that resulting from the use of cod liver oil.

Substances listed as giving positive results on irradiation are wheat, rolled oats, corn, hominy, cream of wheat, shredded wheat biscuits, corn flakes, patent wheat flour, cornstarch, meat, milk, and egg yolk. "That such a wide variety of foods can be thus affected appears to be due to the fact that practically all naturally occurring foods contain lipoidal constituents of the nature of sterols which can carry this activation."—H. Steenbock and A. L. Daniels, *Jour. A. M. A.*, 84, 15:1093–1097, 1925.

A Further Report on Imparting Anti-rachitic Properties to Inert Substances by Ultraviolet Irradiation—An extension of the authors' previous studies on the activation of inert substances with respect to anti-rachitic properties is reported with the following results:

Irradiated green wheat tested after storage at room temperature for 2 weeks and irradiated green lettuce tested after storage for 3 days were found to have lost none of their anti-rachitic properties. Of various other substances tested for activation by irradiation, positive results were obtained with etiolated yellow wheat, etiolated yellow lettuce leaves, and refined wheat flour, and negative with chlorophyll, red blood cells, cream, the phosphatide of egg yolk, and glycerol.—A. F. Hess and M. Weinstock, *J. Biol. Chem.*, 63, 2:297–304, 1925.

The Antirachitic Value of Irradiated Phytosterol and Cholesterol, I—Phytosterol prepared from the unsaponifiable matter of cottonseed oil and rendered as pure as possible by numerous recrystallizations was irradiated in a 1 per cent suspension in water for ½ hour at a distance of 1 foot and then fed in 0.25 c.c. amounts to rats on a slow phosphorous diet, with complete protection against rickets. Similar results were obtained with cholesterol from brain tissue. Of the irradiated cholesterol, the amount required to secure protection was about $^1/_{150}$ per cent of the entire daily ration. Irradiated lanolin was found to have a slight degree of protective power.

It is considered of significance not only that a well-defined chemical substance can be rendered anti-rachitic by irradiation, but that in this case the substance should be cholesterol, a normal constituent of the deeper layers of the skin. The significance of cholesterol in the ordinary protection of animals against rickets by exposure to light is suggested.—A. F. Hess, M. Weinstock, and F. D. Helman, *J. Biol. Chem.*, 63, 2:305–308, 1925.

The Ultraviolet Rays of the Sun—It is shown that the amount of radiation in what is called "the anti-rachitic region of the solar spectrum" is very small during the winter months, that there is no close parallelism between the incidence of rickets and the yearly amount of actual sunshine, and that the occurrence of rickets does not depend upon an equable distribution of sunshine throughout the year. The determining factor is shown to be not the quantity of the sun's rays but the quality, *i.e.*, the amount and intensity of the short ultraviolet rays. Since the quality of the sun's rays is very poor during the winter months, it is considered doubtful if much is to be gained by the use of quartz panes in place of ordinary window glass in nurseries, but that

resort must be made during the winter months to ultraviolet light from artificial sources, or the use of cod liver oil or potent extracts of this oil, or foods that have been activated by irradiation as noted in the above paper.

It is suggested in addition that something can be accomplished in increasing the value of milk by the action of sunlight on the cow and on the fodder which it consumes.—A. F. Hess, *Jour. A. M. A.*, 84, 14:1033–1037, 1925.

Dietary Control of Nephritis—In this paper the author emphasizes a point that is often overlooked in special diets for pathological conditions such as nephritis, gastric and duodenal ulcers, diabetes, etc., namely, that it is quite as essential for the sick as the well person that the diet be adequate from the standpoint of the modern principles of nutrition, particularly as regards quality of protein, sufficiency of calcium, iron, and other inorganic elements, and an abundant supply of vitamins. With this in mind, present knowledge concerning the treatment of nephritis is outlined with reference to the dietary measures involved, the dietary limitations are discussed, and a general plan of dietary control is presented.—M. Koehne, *Jour. A. M. A.*, 84, 15:1103–1106, 1925.

Moulds on Frozen Meats—In reply to the paper of Wright in which the conclusion was drawn that black spot on cold storage meat may be due to other moulds than Cladosporium herbarum, the author states that he has repeated two of the experiments reported by Wright, the inoculation of meat with spores of Mucor mucedo and with species of Penicillium, with no development of black spot in either case. He reiterates his earlier statement that C. herbarum is the sale cause of black spot.—F. T. Brooks, *J. Soc. Chem. Indus.*, 43, 40: 306T, 1924.

The Possible Relation of Copper to Disease among the Korean People—The observations reported were occasioned by the paper of Mallory on the relation between chronic copper poisoning and hemochromatosis. It is noted that in Chosen (Korea) brass is the material of which all food utensils are made. Not only is food cooked and served in brass dishes, but left-over food is allowed to stand from one meal to another in brass. Of various diseases associated in the literature with copper, diabetes of the bronzed type is of rare occurrence among the Koreans, but cirrhosis of the liver is a common disease. "It is hoped that careful search will be made for evidences of copper poisoning in clinical and necropsy material in the Orient, and special study made of those cases of diabetes and cirrhosis as occasion offers."—R. G. Mills, *Jour. A. M. A.*, 84, 18: 1326–1327, 1925.

Physiological Significance of Biosterin (So-called Vitamin A)—The concentrated preparation of vitamin A previously noted has been used in feeding experiments on rats and mice to determine its quantitative relation to the other constituents of the diet.

The minimum amount of growth was between 0.000001 and 0.000005 gm. With increasing amounts up to 0.01 gm. daily, growth was improved, but with larger amounts growth was less satisfactory and the preparation appeared to be even harmful. In curative tests the same unfavorable effect was noted with excessive dosage. Similar effects were also noted in experiments conducted on dogs.—K. Takahashi and J. Nakamiya, *Japan Med. World*, 5, 1:2–9, 1925.

Distribution of Vitamin X in Natural Foods—Foods of animal and vegetable origin in which vitamin X is present are listed. These include a great variety of animal tissues in which the vitamin is present but not in concentrated form; vegetable tissues such as green leaves, certain fruits (banana), and seeds; and vegetable oils, most of which contain the vitamin in low concentration. The ether extract of wheat embryo and desiccated lettuce leaves are said to contain the vitamin in more concentrated form than any other materials tested.—H. M. Evans and G. O. Burr, *Abs. in Anat. Record*, 29, 5:356, 1925.

Studies on Organisms Concerned as Causative Factors in Botulism—This is the complete report of the author's investigations on the organisms causing botulism, some of which have been noted previously from other sources. The report is presented in the following sections: Cultural and immunological study of strains of organisms concerned in botulism; further data on type C strains; properties of toxin and antitoxin of organisms concerned in botulism; and standardization of antitoxin. An extensive bibliography is appended.—I. A. Bengson, *Hyg. Lab. Bull.* No. 136, pp. 96, 1924.

Effect of Fluorine on the Quality of the Teeth—This paper includes a brief review of the literature on the occurrence of flourine in natural foods, water, and animal tissues, and the report of a series of feeding experiments in which a comparison was made of the appearance of the teeth of rats on a balanced diet and the same diet with the inclusion of sodium fluoride to the extent of 226 parts per million. The basal diet consisted of wheat 67.5, casein 15, whole milk powder 10, sodium chloride 1, calcium carbonate 1.5, and butterfat 5 per cent. The diet containing fluorine had the same composition except that 0.1 per cent of a mixture of equal parts of dextrin and sodium fluoride replaced an equivalent amount of wheat. The rats, which included 15 controls and 16 on the fluorine-containing diet, were killed at stated times and careful examination was made of the skull and teeth.

The rats on the fluorine-containing ration were slightly stunted in growth, but were fertile and raised their young. Marked differences were apparent in the teeth of these animals. The incisors grew to abnormal size and in abnormal positions, and were of a dull opaque whiteness entirely lacking in luster. The molars did not differ from normal except that their enamel surfaces were lacking in luster.

In commenting upon these results, attention is called to the fact that defective structure and injuries in the teeth have generally been attributed to dietary deficiencies, but that in the present study it has been demonstrated that over-ingestion of an element regularly found in both food and tissues may also be harmful.—E. V. McCollum, N. Simmonds, and J. E. Becker, *J. Biol. Chem.*, 63, 3:553–562, 1925.

Irradiation of Milk and the Healing of Rickets—The value of irradiated milk in the dietary treatment of infantile rickets is shown in radiographs of the wrists of three children before and after one month on a diet furnishing 1 pint of milk daily as practically the only source of vitamin A. In two cases the milk had been irradiated for 20 minutes by two exposures in shallow dishes to a mercury-vapor lamp at a distance of 3 feet, and in the other non-irradiated milk was used. In the case of the child receiving untreated milk there was only a slight increase in calcification at the lower ends of the radius and ulna, while in the other two cases dense calcification had taken place. "This quite definite and remarkable 'activating' effect of ultraviolet rays on foodstuffs is obviously well worth following up and opens up new possibilities in the treatment of infantile disorders."—S. J. Cowell, *Brit. M. J.*, 3352:594–595, 1925.

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CHILD HYGIENE

MERRILL E. CHAMPION, M.D.

Simplifying the Hot Lunch Problem in Rural Schools—The actual working out of a system by which warm lunches may be served in rural schools has practical difficulties. How these difficulties were overcome in a Wisconsin county is told by Miss Jeanette E. Pugh, R.N., in an article, "Warm Lunches for Rural Schools," in the *Public Health Nurse:* The equipment necessary is an ordinary wash boiler, 2 specially made racks, 32 half-pint, wide-mouthed fruit jars, or 1 for each pupil, and a stove. Each rack, with perforated bottom, is divided into 16 compartments. The lower rack is raised 2 inches from the bottom of the boiler to keep the jars above the water level. Only 1 inch of water is used, since that requires little heat to produce steam. Each child has his individual jar, which he fills at home, and places in the rack before school. Any liquid or solid food, from soup to sauerkraut, may be brought in these jars. At about 11 o'clock the teacher places the boiler on the stove, steams the food 20 to 30 minutes, and later distributes it quickly by a "line-up." This system has many advantages and apparently no disadvantages.

The article also contains a description of the method used to obtain clean hands with a minimum of water, soap, towels and time, and a maximum of hygienic efficiency.—*Pub. Health Nurse,* 18, 1:4 (Jan.), 1926.

Rights of Newly Born—DeBuys urges that daily observations of the newly born should be made, beginning from the time the cord is tied. The nearer birth this supervision is begun, the better for the infant. The temperature and the weight curve should be observed closely, as they frequently give the first indication of impending trouble. It should be remembered that the greater the loss of weight, the less the resistance of the individual; and if to this diminished resistance is added an infection, a digestive disturbance, or an organic disease as, for example, a hypertrophic pyloric stenosis, the infant's chances are materially diminished. Excessive losses in weight should, therefore, be avoided as much as possible. In order to prevent an unnecessary loss in weight, the feeding of the infant must be conducted efficiently. With a daily observation of the temperature, the weight curve, supervision of the breasts, daily inspection of the infant's stools and a thorough knowledge of the diseases of the newly born, it is hardly likely that any condition will be overlooked and the newly born will receive his just deserts.—Abstr. *South. M. J.; Jour. A. M. A.,* Jan. 16, 1926.

Dietary Hygiene—"In the field of dietary hygiene the most significant recent advance has perhaps been the extension of work on the dietary factor related to fertility. Evans and Mason have shown that in the male as well as in the female the absence of the fat soluble E vitamin, found in lettuce leaves, milk fat, beef musculature, wheat germ, etc., from an otherwise adequate diet leads to complete sterility accompanied by extensive degeneration of the reproductive tissues. The work of the last 5 years tends more and more to emphasize the fact that a diet adequate for growth may lack subtle elements which are essential for longevity, resistance to disease, and reproductive power and to remind us that the importance of an adequate diet is far greater than we have hitherto realized."—*Nation's Health,* Jan., 1926.

Accident Prevention—If, as is stated by Ethel M. Hanson in an article entitled "Home Accidents and Their Prevention," 50 per cent of 40,000 accidents happening in the United States during the year 1923, occurred in the homes of this country, we shall indeed do well to inquire into the causes of these accidents and endeavor to discover means by which they may be prevented. Though we are not told what proportion of these accidents are among children, we can readily believe that it is large, especially as we learn that first on the list of home injuries are falls while burns and scalds have second place. We learn, too,

that 1,000 children are burned to death from playing with matches.

The most effective remedies have been found to be education which shall reach all classes of homes beginning with safe construction of buildings and play facilities provided by the community where safe conditions for play cannot be provided at home.

A few timely suggestions are offered which may serve to prevent some of this appalling number of accidents: for instance, the keeping of tools and knives where children cannot reach them, making it a habit always to disconnect an electric iron when called away, locking up guns if one must have them. As a warning against using poisons unknowingly a pin may be stuck through the cork of the bottle, point up, and the medicine closet fastened high on the wall and never opened in the presence of young and curious eyes. Boiling water should be guarded as carefully as poison. Mothers should be cautioned to keep matches out of reach of children and to turn handles of pots and pans away from the edge of the stove.

"A child of two will watch his father striking a match on the table or window sill and will imitate him the first chance he finds." "The only age limit that can be placed on the teaching of safety is the time when the child first begins to imitate."

The National Safety Council has made a study of accidents and has prepared literature and charts to aid in an educational campaign. The *National Safety News* says, "Knowledge, like money, must be possessed individually to have individual purchasing power, and only a close study of accident prevention methods as outlined in the available literature will reward the student of safety with his share of immunity from injury."—*Hygeia*, Jan., 1926.

New Zealand's Maternal Mortality—It has been occasion for much comment that the remarkably low infant mortality rate (46.2) in 1924 of New Zealand has not been accompanied by an increasingly low rate of maternal mortality. This rate in 1924 was 5 to the 1,000 live births. This figure to a health worker in this country would seem a very creditable one but the Ministry of Health of New Zealand calls attention to the fact that the maternal rate has not been falling with anything like the rapidity with which infant mortality, the general death rate and other rates have decreased. Furthermore, the maternal mortality rate is higher than that of England and Wales.

The maternal mortality of New Zealand has, therefore, become of great concern to the Ministry of Health which is a highly centralized organization well adapted to secure prompt and concerted action upon any problem toward which it directs effort.

As a first step, a well known educator in obstetrics has been appointed consultant with the immediate duty of raising standards of training for maternity nurses and midwives.

Maternity hospitals will be licensed and rated. It will henceforth be required also that in any private hospital all maternity cases with a temperature of a hundred degrees or over during any three days of the puerperium shall be reported.

"The nurses and midwives registration bill now before Parliament is regarded as a very essential part of the present campaign for the promotion of maternal welfare."

"The department activity to encourage hospital boards to provide maternity wards in connection with the public hospital system, particularly in outlying districts where private hospitals have not found it profitable to embark upon this venture, has resulted in 24 out of 47 hospital boards establishing maternity hospitals or wards in conjunction with their general hospitals. Several hospitals have 2 or more distinct maternity hospitals, so that now a total of 38 wards or hospitals devoted to maternity work are under control of the hospital board, with a total of 232 beds. Seven state hospitals have added 124 beds, while 5 other institutions are in course of erection."—*Nation's Health*, Dec. 15, 1925.

Health and Physique of School Children—*School Housing*—Dr. Rogers says, in part, that despite recent progress in the healthful housing of school children, in many parts of the country deplorable conditions exist.

Playgrounds—At the present time organized municipal playground activities are being carried on frequently under the control of boards of education and this seems a rightful supervision.

Medical Inspection—Even in the 42 states "requiring or permitting medical inspection" there is much to be accomplished in the way of detection and correction of physical defects that will put the child in a condition where he is "free to learn." He stresses the interest which should be the teacher's in the physical or mental

possibilities of the child. He favors the teacher who is trained in observation of objective symptoms.

In Dr. Rogers' plan the parents are to cooperate with school health authorities by (1) Being present at physical examinations, and (2) furnishing examiner with information about the child.

The opportunities in school nursing service are increasing everywhere and are proving indispensable.

"In 80 per cent of cities with a population of 10,000 to 100,000 furnishing information, the administration of medical inspection is under the department of education. As communicable disease becomes negligible the school health work will become more exclusively educational. At present the status of the work in rural communities parallels the public health intelligence of the individual tax payer which is below par. The qualified leaders are lacking because of inadequate salaries paid.

Dental Work—Dental work in schools is developing through employment of more dentists and dental hygienists who employ prophylactic, reparative and educative methods.

The most important deduction of all the dental work seems to be that research and experiment show the importance of proper diet from the prenatal period on in "making and maintaining teeth."

Nutrition—Dr. Rogers calls the "movement to improve the child's food habits" the most important health work of the age and claims that it gives promise of far reaching results in health and money.

In the open air schools and open-window rooms "extra feeding, rest periods and a sympathetic atmosphere" are the important factors in the success of these rooms. But he contends, "every child in every class has a necessity for pure air at a comfortable temperature." Active tuberculous children should be placed where they have best conditions 24 hours of the day. Too, he mentions Dr. Rollins' recent work in giving school children not only abundant air but much sunshine also.

The summer camp is a private institution furnishing tuberculous school children or malnourished ones an ideal health regime during summer. It deserves to become through public funds the privilege of all children.

Other special classes cover many special defects, such as eyesight conservation, hard of hearing, speech defects, special heart clinics.

Health education includes training in practice and theory of hygiene. The work has been stimulated by the American Child Health Association, Joint Committee of National Education Association and American Medical Association, American Red Cross, National Tuberculosis Association, and National Child Welfare Association. Here again the coöperation of parents is necessary. Textbooks and teaching methods are improving in elementary schools but in high schools there is much room for improvement.

Sex hygiene is very gradually being introduced into the school program. Health education also includes teaching of home hygiene, care of children and of the sick. The American Red Cross has stimulated this.

Physical Training—Thirty-three states have passed laws making physical education a part of the school curriculum. Fourteen states have appointed state directors in the subject. Two hours a day is more adequate than a 20-minute drill. This phase has included development of playgrounds and swimming pools.

Seven hundred and eleven cities now maintain playgrounds. These always require adequately trained directors. Other interesting phases of the health developments include all those organizations for the adolescent boy and girl which develop him mentally, morally and physically. Safety first and first aid have been greatly furthered by American Red Cross and school authorities. The preschool period is now being considered of tremendous importance and for this age habit clinics and infant welfare clinics are being developed under public health administration.—James Frederick Rogers, M.D., U. S. Bureau of Education, *Bull. No. 21*, 1925.

Milk—The effectiveness of pasteurization as a means of providing a safe milk supply is brought out in striking fashion in a midwestern state where according to an editorial in *Hygeia* an "inspired" legislator succeeded in securing the passage of an act which prevented the enforcement of tuberculin testing of cows in that state. As a result of this legislation there has been a concentration of tuberculous cattle in certain sections which has become known as the "black belt" of the dairy industry. Samples of milk coming from this district have been found to be more than twice as heavily infected with tubercle bacilli as samples taken at random from other counties in the state.—*Hygeia*, Jan., 1926.

EDUCATION AND PUBLICITY

EVART G. ROUTZAHN *

GOOD NEWS SUPPRESSED

UNDER this heading the *Saturday Evening Post* for January 30 in a two-column editorial calls upon the medical profession in general, and public health workers in particular, to acquire more skill in talking and writing about health in everyday language.

National, state, county and local officials and physicians are urged to get together and broadcast through the press information that will be as understandable as "the effusions of the sporting editor." The comparison is unfortunate since the sporting editors seem to write mainly for the elect, but the intention of the editorial writer is made clear in these paragraphs:

"Clergymen can deliver their messages in words of one syllable to high and low alike. Lawyers, by skill of word and clarity of expression, can make juries of the most limited education comprehend the essentials of highly intricate cases. The doctors alone are the bond-slaves of a vocabulary drawn from the dead languages.

"Our physicians, surgeons and health officers are fairly boiling over with important information which they desire to communicate to the general public; but somehow they lack the simple, racy English in which to get it over or the sense of form and accent which would make it interesting and attractive. This inability to write plain understandable English, so readable in form and so accurate in statement that it is easy to make it accessible to large bodies of readers, is costing thousands upon thousands of American lives every year. Attention is called to this condition not as a matter of literary criticism, not as a reproach to the profession because it has produced so few Oliver Wendell Holmeses, S. Weir Mitchells and Sir William Oslers to enrich our general literature, but because it has a message to Garcia which it is not delivering. . . .

"The enlightened physician has a great body of news of the highest importance to communicate to non-medical readers. He is fully alive to the educative powers of the newspaper and periodical press, but he does not know how to use the mighty engine he has so long despised. He is unable to frame his warnings with such skill that he can have them printed; or having had them published, he cannot lure people into reading, digesting and heeding them. His love of long, accurate Greek and Latin words is his besetting sin, and his punishment is in witnessing the affliction which might have been avoided if he had been able to deliver his message interestingly in simple vernacular English."

Here is a challenge not to be ignored. Some of our readers perhaps will take issue with the editor of the *Saturday Evening Post*, and claim that through the many avenues of pamphlets, motion pictures, posters, news articles and talks we have already popularized health information sufficiently to bring it within the understanding of the least educated part of our population. Much has been accomplished; but it is undoubtedly true that a great deal of our writing and speaking, and even many of our pictures go over the heads of the persons who most need the information. Take this matter of terms. At the present time an active campaign against diphtheria is being carried on in many states. The words which must be used on the posters and in literature include "toxin antitoxin"—six syllables; "immunization"—five syllables. Is there any short-cut by which parents whose reading is confined chiefly to picture-papers and whose recreation is mainly looking at pictures can learn that a simple treatment that hurts

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York City.

very little and costs nothing can save their children from getting a serious disease?

Here is what we are up against, as reported by Dr. George W. Goler, of Rochester, in his December, 1925, bulletin: "As far as we could, within our power, we have taken the means of prevention to people. We have preached it in the schools, written about it in the newspapers and pamphlets, published booklets by the tens of thousands and distributed them, and we have had demonstration stations in the schools, both for school children and for preschool children. We have advertised in the newspapers, and on some occasions we have talked to groups of people about the desirability and their duty of having their children and themselves protected against diphtheria. We have, too, shown a moving picture of diphtheria to many thousands of people. Still 250 families have been invaded by this disease, and in some families the disease has been so serious that there have been 52 deaths."

Are we teaching or are we merely telling the facts? Are we getting the attention of the people and helping them to understand, or are we getting our material off the shelves? Are we leading people to believe in us so that they will seek to understand our message and will believe that our facts *are* facts?

A Home-Made Annual Report—Hand work is usually more prized than machine work. An annual report in a limited edition which appears to be and is handmade might well be substituted for the customary printed report by a county or small town health officer.

Such a report has reached us with the compliments of the Gilmer County Health Department of West Virginia. It contains 17 legal-sized pages of well done mimeographing, generously spaced, and two inserted blank sheets on which are mounted photographs, 2½ by 4 inches, illustrating the work of the department. One of the best features is a blueprint spot map of the county on which symbols indicate the five major activities of the year. The cover is made of a heavy brown cover paper with a simple border in gold, which is effectively handdrawn. The whole is held together with staples. The report is unduly modest in not making clear that the office is located on Court Street in Glenville. Dr. Eugene O. Chimene is the health officer.

Will You Be at Atlantic City?—If you will be there for the Wednesday morning session, May 19, on education and publicity please notify the editor of this department as early as practicable. The participation of members of the Education and Publicity Section and others interested will contribute largely towards the success of the session.

Any form or type of publicity material for "Popularizing Health Information" will be considered for use in the clinic if received by the editor by May 1.

"Have You Any Newspapers?"—The fact that the visiting nurse finds a dozen different uses for old newspapers is the peg on which the Chicago Visiting Nurse Association hangs a readable story of visiting nurse work told in a generously illustrated folder. In reading about how nurses make newspapers serve as coverings for chairs, tables and mattresses in the interests of cleanliness, we cannot help but learn much about what the nurse does in the home. Ask the Visiting Nurse Association of Chicago, 104 South Michigan Avenue, to send you a copy of the folder which is called "Visiting Nurses and Newspapers."

Safety Poster Ideas Wanted—Prizes of $15, $10 and $5, are offered by the Employers Mutual Liability Insurance Company, Wausau, Wis., for the best suggestions for safety bulletins illustrating common accident hazards.

The conditions of the contest are that the idea should be original and preferably one that can be illustrated by a sketch or photograph; and the wording brief and striking. The contest closes April 1, 1926.

Advance Criticism—"We would like very much to have your frank criticism of the enclosed copy of our staff report. Won't you please consider it from the standpoint of printing, type arrangement, cover page and contents of the various reports and let us know what you think about it? This letter is not sent to you to draw forth a formal expression of praise. We want your real opinion based on

a study of the thing itself and we shall be more grateful to you for criticisms than we should be for merely nice words."

It would be a very useful thing for all organizations to submit manuscript of reports to outsiders for detailed criticism. Pay for the service if necessary. In many cases a teacher of English who is more than a mere machine teacher would contribute his services. Sometimes a friendly newspaper man might do the job.

Even when we have done a really good piece of work—and we know it—almost certainly some poor writing has slipped in because we are so close to our own manuscripts.

A Gay Reminder of the Next Clinic Date—When mothers leave the Mulberry Health Center each one receives a calendar for the next month on which is plainly marked the date of the next visit to the center. Every month is represented by a brightly colored card 6¾ by 9¾ inches in size, and each of six colors is used twice in the course of the year. In addition to the calendar for the month every card carries a lively silhouetted picture with a very few words of text on some personal hygiene message. This seems to be one of the most useful of the practical forms of educational material devised by Lucy H. Gillett, superintendent of nutrition, Association for Improving the Condition of the Poor, 105 East 22d St., New York, N. Y. A few extra sets are available at $1.00. Possibly other health agencies may wish to share in the publication of this calendar another year, thus reducing production costs. Probably arrangements can be made for the use of the plates for the remainder of 1926 if someone wishes to test the idea.

"Twenty-Five Years Ago"—If a local newspaper publishes from day to day reminders of what happened a quarter of a century ago it may be well for you to set a volunteer at work digging out public health or other social welfare events. Bring them to the attention of the editor of that department, for in the mass of material he must handle he may overlook the events in which you are interested. For one item watch for well known local names among those elected as board members or officers 25 years ago. Watch also for official action taken or plans made which now seem much out of date, or which may have led to great gains in the course of the quarter century.

DATES AHEAD—APRIL, 1926

Health and Outdoors Book Month—National Association of Book Publishers, 25 West 33d St., New York, N. Y.
Daylight saving begins.
1—April Fool's Day.
2—Good Friday.
4—Easter.
4–10—National Negro Health Week—Tuskegee Normal and Industrial Institute, Tuskegee Institute, Ala.; U. S. Public Health Service, Washington, D. C.
5—Seventh Day of Passover (Hebrew).
6—Eighth Day of Passover (Hebrew).
7–9—Convention: All-Western Direct Mail Advertising Association, Los Angeles—Address: Ambassador Hotel, Los Angeles.
13—Jefferson's Birthday.
25–May 1—Better Homes Week—Better Homes in America, 1653 Pennsylvania Ave., Washington, D. C.

"Health Posters from Hygeia"—This is the title of a pamphlet which contains photographs of more than 200 of the 4,492 posters which were entered in the 1924 high school poster contest. The pamphlet includes "How to Plan a Poster" and "Teaching Health by Posters." 30 cents a single copy, with special quantity rates.

Sets of the original health posters, some of them very well done, are being loaned for periods of 2 weeks at a nominal charge of $1.00 to cover the cost of preparing for shipment. Address *Hygeia*, American Medical Association, 535 North Dearborn Street, Chicago.

Canadian Social Hygiene Council Has a Division of Education—Early last year the Canadian Social Hygiene Council received from the Metropolitan Life Insurance Company a grant of fifteen thousand dollars, with which to initiate a division of education and carry on throughout the Dominion a program of instruction in social hygiene.

Professor Peter Sandiford, Ph.D., Superintendent of the College of Education, Toronto University, has been appointed to the chairmanship of this new department of the council and A. D. Hardie, M.A., of Cambridge, England, is executive secretary. Mr. Hardie is a former head master of a boy's school, and has been associated closely with Sir Michael Sadler on the National Educational Committee in Britain.

May Day-Child Health Day—The American Child Health Association is working primarily with and through the State Departments of Health in developing 1926 promotion of May Day as National Child Health Day, and with the U. S. Department of Agriculture, the General Federation of Women's Clubs and the National Congress of Parents and Teachers, in coördinating all resources in unified community child health programs. This combination event will receive much boosting from numerous sources. Health agencies will wish to canvass the situation in their cities and states to make sure that both state and local organizations and departments get the fullest possible benefit from the affair, and at the same time to ensure that the local program is more than a mere festival occasion. The American Child Health Association, 370 Seventh Avenue, New York, N. Y., will refer you to the known coöperating bodies in your territory.

A Public Revolt Against Spitting—The National Tuberculosis Association, 370 Seventh Avenue, New York City, has issued a new manual on how to conduct an intensive campaign against spitting. It is illustrated with reproductions of posters, car cards, cartoons and photographs of campaign stunts, and contains sample news stories, speeches, and copy for folders. Practically all of the examples have been used in one or a number of cities. The directions for carrying out such a campaign are very complete and practical. About a year ago the National Tuberculosis Association evolved an anti-spitting campaign manual in their office. Then they tested the plans in Syracuse, found how better to do it, and passed on the revised ideas to the state tuberculosis associations. After many further testings the material for the present manual was gathered. You will wish a copy.

Suppose Your Newspaper Carried Only the Box Score of the Great Game?—"Editors and copy readers grow gray trying to discover news angles in the average reports which come to them for publication. They either print the report as submitted, turn it over to a rewrite man who knows nothing about the subject, or consign it gently but effectively to the waste basket.

"What would you think of the newspaper that carried only the box score of your favorite game without any explanation as to how the game was won or lost? It is the comment of the writer who sees the game and understands it that makes people read baseball news. The health commissioner's report which merely gives a tabulation of his activities without comment, comparisons or conclusions, is lacking in the chief element of a news story, namely, interest."—*Health Publicity*, Ohio State Department of Health.

Educational Work of the Red Cross Public Health Nurse—"In both county and town work the nurse stimulates and helps with health educational projects. Lectures in personal and home hygiene and in community sanitation to groups, such as Parent-Teacher Associations and Women's Clubs, are arranged; where authorized, classes in home hygiene and care of the sick are taught; exhibits and demonstrations at county fairs, and wherever large groups assemble; health weeks, health surveys, health clubs, clean-up campaigns, parades, health movies and the like, all form part of the rural public health nurse's duties."—*Information for Nurses*. American National Red Cross. Revised January, 1926.

Newark's 100 Year Club—"A unique organization is Newark's One Hundred Year Club, whose slogan is 'A Century Mark for Each Member.' No member is less than 70 and some are 93 years old."—*American Medicine*. January, 1926. You may find enough oldsters in your city or state to start such a club. It may be made of especial value if you can get them to agree to a few, a very few simple rules which may help to carry them to the 100-year stage. You will wish to guard against the possibility that one or more of the group may have violated enough health laws to ruin the lesson.

The Louisiana Almanac Again—The 1926 almanac of the Louisiana State Board of Health has a most attractive cover in green, red, and black and contains the usual varied collection of interesting information and practical health advice. It is illustrated with simple line drawings and is well printed. It would be hard to find a form in which to put up health advice in which it would be more likely to be valued and read, than in this useful and long familiar type of household friend.

LAW AND LEGISLATION

JAMES A. TOBEY, LL.B.

Federal Health Correlation—As was mentioned in February JOURNAL, a delegation representing the American Public Health Association, the informally organized National Health Conservation Committee, and the Institute for Government Research called upon President Coolidge on January 14. They expressed the opinion that the time had come for a better coördination of the health work of the national government and stated that, for the first time in the history of American public health, leading sanitarians were agreed as to how it should be accomplished. The proposal is that the President be given authority to assemble by appropriate means the principal health activities of the government, or to require the detail of scientific personnel from a central federal health service to direct or assist in the operation of other health processes of the government. Complete data concerning the activities of all branches of the government concerned directly or indirectly with any phase of public health have been gathered by the Institute for Government Research and will be issued in book form in the immediate future. This information will serve as the basis upon which the President could decide transfers, if he should be given authority by Congress to make them. A copy of the summary and recommendations of this report had already been presented to the President and discussed in some detail with him by Mr. Haley Fiske.

Mr. Coolidge seemed receptive to the proposition, though of course he could not indorse any specific plan until he had studied all the details. He suggested that a bill for the necessary legislation be drafted and placed before Congress. Such a bill has been prepared, and, at the time we write, early in February, has been given to appropriate congressional leaders, though it has not yet been introduced.

Health Bills Before Congress—No action had, up to Febuary 4, 1926, been taken on any of the measures of interest to sanitarians, as listed in the February issue of the JOURNAL. There have, furthermore, been few new bills of any importance to national vitality. Such measures as there were, are as follows:

Maternity and Infancy—The Federal Maternity and Infancy Act comes to an end with the fiscal year 1927, as it was passed on November 23, 1921, for a 5-year period only, beginning with the fiscal year 1922. Bills have been introduced in the Senate (S. 2696) and in the House (H.R. 7555) to extend the act to include the fiscal years 1928 and 1929. Hearings on the latter bill were held before the Committee on Interstate and Foreign Commerce of the House the middle of January. State directors of child hygiene were attending a conference in Washington at that time.

Food—Various amendments to the Federal Food and Drugs Act have, as usual, been proposed. These include H.R. 6759 and H.R. 7063, to include articles sweetened with corn sugar in the terms of the Act; H.R. 7374, to add meat which is not kosher. H.R. 6547 would prohibit the sale, etc., of deleterious butter, and is aimed at oleomargarine.

Narcotics—Representative Kindred introduced H.R. 8529 on January 28, to provide for federal subsidies to the states for the control of narcotics. This is similar to S. 1800 described in the abstracts in the February JOURNAL.

Poisons—Representative Griest introduced H.R. 8305 on January 25 to safeguard the distribution and sale of certain dangerous caustic, or corrosive acids, alkalies, and other substances in interstate and foreign commerce. The bill defines various dangerous articles, and requires them to be adequately labeled, prohibits misbranding, and otherwise safeguards their use.

Study of Abnormal Classes—Bills have been introduced in the Senate (S. 2885) and House (H.R. 8601) to establish a laboratory for the study of abnormal classes, such as the insane, dependent and delinquent. The former bill would place a laboratory for the purpose in the Department of the Interior, while the latter measure would impose the duty on the Public Health Service.

Venereal Disease—There was reported in the Senate on January 30 a measure introduced by Mr. Wadsworth as S. 2828 to provide for the forfeiture of pay of persons in the military and naval services who are absent from duty on account of the direct effects of the intemperate use of alcoholic liquor or habit-forming drugs or because of venereal disease.

Anti-vivisection—Senator Fletcher introduced S. 2957 on February 1 to prohibit experiments upon living dogs in the District of Columbia or in any of the territorial or insular possessions of the United States. This is the usual anti-vivisection bill which pops up every now and then, sponsored by "savage, lean, hungry, anti-everythings."

Miscellaneous—Senator Copeland has introduced a bill, S. 2142, to regulate clinical thermometers shipped in interstate commerce. Senator Metcalf has a bill, S. 2925, to establish a veteran's hospital at Providence, R. I.

Physicians in Congress—The Congress of the United States is made up of 96 Senators and 435 members of the House of Representatives. About two-thirds of these congressmen are lawyers or have had legal training. The remainder are mostly business men, farmers and publishers, with a sprinkling of educators and engineers. Only 6 are physicians, 5 of whom are members of the House. There are 3 dentists, 2 of whom are in the House. In previous Congresses the number of physicians has been slightly greater, though the profession has never been well represented at the Capitol.

The only one of these 6 physicians who has been a professional sanitarian is Senator Royal S. Copeland, Democrat of New York, who, as is well known, was formerly health commissioner of New York City. He was graduated in medicine from the University of Michigan as a homeopath. He has served as vice-president of the American Public Health Association and is always interested in national legislation affecting public health.

The dentist in the Senate is Henrik Shipstead, Farmer-Labor of Minnesota. Two other senators, Woodbridge N. Ferris, Democrat of Michigan, and George H. Moses, Republican of New Hampshire, studied medicine for brief periods.

Three of the physicians in the House are Republicans and 2 are Democrats. Three were in active practice when elected, while 1 was engaged in farming, and the other, who is also a lawyer, was specializing in legal medicine and the practice of law. Dr. Edward M. Irwin, Republican from Belleville, Ill., was graduated from Missouri Medical College at St. Louis and practiced from 1892 until elected to the 69th Congress. Dr. Ladislas Lazaro, Democrat from Washington, La., has been a member of the last seven Congresses. He was educated at Holy Cross College, New Orleans, and was graduated in medicine in 1894, having been in active practice until 1913. Dr. John J. Kindred, Democrat from Astoria, N. Y., studied medicine at the University of Virginia and Hospital College of Medicine of Louisville, Ky., from which he took his M.D. degree in 1889. He is also a law graduate and has lectured on medical jurisprudence. He is especially interested in mental diseases. He served in the 62nd Congress and from the 67th Congress to date. Dr. William T. Fitzgerald, Republican from Greenville, O., was graduated from Wooster University Medical School and practiced until elected to the 69th Congress. Dr. John W. Summers, Republican from Walla Walla, Wash., engaged in the practice of medicine for 25 years after graduation from the Kentucky School of Medicine and the Louisville Medical College. He has been in Congress since the 67th Congress.

The 2 dentists in the House are Dr. Roy O. Woodruff, Republican from Bay City, Mich., who was graduated from the Detroit College of Medicine; and Dr. Frank Crowther, Republican from Schenectady, N. Y., who is a graduate from the Harvard Dental School. Both of these men have served in a number of Congresses.

Although these doctors and dentists are the only representatives of their professions in Congress, the biographical sketches of some other members, as given in the Congressional Directory, reveal an interest in public health and medical matters. Thus, Robert G. Houston, a lawyer, Republican of Delaware, was a member of the First State Anti-Tuberculosis Commission and is now vice-chairman of the Commission for the Feeble-minded, while Representatives Louis A. Frothingham of Massachusetts, Ernest R. Ackerman of New Jersey, and John M. Morin of Pennsylvania, all Republicans, are trustees of various hospitals. Unfortunately, none of the engineers in Congress are sanitary engineers.

As the profession of public health increases in scope and influence, the time may come when

it will be more adequately represented in our national legislative assembly, and such representation, needless to say, would be a good thing.

Water-works Operation—The weight of authority in the court decisions holds the operation of a water-works to be a business rather than a governmental function of a municipality. An interesting point in connection with the imposition of federal taxes on operators of such municipal plants has recently arisen, according to an editorial in the *Washington Post* for February 1, 1926. State and municipal employes and officers are exempt from the federal income tax, provided they are engaged in governmental activities. The United States District Court of Michigan recently held in Frey v. Woodworth that the operation of water-works is a governmental function and, therefore, such operators are exempt from federal taxation. This case is now before the Supreme Court, the decision of which will be an interesting and important one. The case has also received attention in the Senate, where it was argued that to attempt to collect such back taxes from 1918 on would be unjust and discriminatory.

Municipal Liability for Typhoid—A city is liable for negligence in supplying polluted water for human consumption, according to a recent decision of the Washington Supreme Court, Aronson v. Everett, 239 Pac. 1011. This decision reaffirms an existing principle of law and other court decisions to this effect are cited in the article on liability in the *American Water Works Handbook* and in *Public Health Law*.

In this particular case, an epidemic of typhoid fever occurred in Everett, Washington, in the summer of 1923 and was traced to polluted river water which had gotten into the city supply through a by-pass at an industrial plant. The plaintiff sued as administrator on account of the death of his wife from typhoid and was awarded $6,000 damages in the lower court. This decision was upheld by the Supreme Court on appeal, on the grounds that a city, while not an insurer of the quality of the water it supplies, is, nevertheless, liable for negligence, just as is a private corporation. This was a question for the jury, which found that there was such negligence. The court held that the amount of the judgment was by no means excessive.

This case and the others which it follows should serve as an object lesson to municipalities to use due care to maintain the purity of the water which they furnish to their citizens. It is a reasonable and proper principle of law which holds the city liable if it does not.

Other Court Decisions—In Oklahoma the State Constitution provides for county boards of health, but says nothing about the county health officer, who is, therefore, not a constitutional officer, but an employe of the board. The state law provides for compensation for expenses of county superintendents of health in suppressing epidemics, but the highest court of the state has recently held in Eckles v. Board of Comr's of Hughes County, 239 Pac. 567, that such payment must be definitely contracted for and is not an involuntary one. In other words, the county health officer could not get compensation for doing whatever he considered necessary, but only for what the board contracted with him to do. County health officers would do well to ascertain their powers under their respective state constitutions and laws.

In California the right of city and county health officers to isolate diseased persons has been upheld in Ex parte Fisher, 239 Pac. 1100, as a reasonable procedure, even though the state law does not expressly confer this power. A person so isolated, who attempted to secure release by habeas corpus, was denied the writ.

Milk Ordinances—The New York State Milk Code, one of the best in the country, will be revised and improved, if possible, in accordance with the recommendations of a committee appointed last December by the Public Health Council of New York State. The committee includes Henry N. Ogden, member of the council and professor of sanitary engineering at Cornell University; Dr. Paul B. Brooks, deputy state health commissioner; Charles A. Holmquist, director of the division of sanitation of the state health department; J. D. Brew, professor of dairy industry at College of Agriculture, Cornell University, and Stephen W. Bateson, superintendent of food inspection, Buffalo. The committee has been studying available data, including other state and municipal codes, analyzing results obtained in the enforcement of state and local milk regulations in several cities and villages and conferring with public officials, dairymen and

others experienced in various phases of milk production, distribution and control. It will be the aim of the Public Health Council and its special committee to formulate a state milk code which may be accepted as a model and which will not only afford a maximum of protection to public health but also be acceptable to milk producers.

The Chicago City Council adopted a new milk ordinance on December 16, 1925. It requires all cows from which milk is produced for sale in the city to have been tested within one year of the sale of the milk, federal and state certificates being acceptable for this purpose. All milk and milk products must be free from sediment, disease-producing bacteria, and other material dangerous to health. Maximum bacterial counts are set at 100,000 per c.c. from October 1 to May 1, and 150,000 from May 2 to September 30, except in the case of inspected cream when limits of 150,000 and 300,000, respectively, are set for these periods. The method of determination of the number of bacteria is required to be such as to conform or equal the methods recommended by the American Public Health Association.

Miscellaneous—Recent state legislation on public health nursing will be summarized and abstracted in an early issue of the *Public Health Nurse*. This article will be supplementary to the review of state laws on this subject, printed in the April, 1923, issue of the magazine.

Hospital Social Service for January, 1926, contains the text of an address on the correlation of federal health agencies, delivered before the conference of state health officers in Montreal last June.

The Pictorial Review Company, New York, has issued an interesting reprint concerning the proposed uniform marriage and divorce law. It is said that there are 49 state and territorial laws and no two of them are alike. The remedy proposed for this confusion and the legal chaos created by it is an amendment to the constitution permitting a federal marriage and divorce law.

The *New York State Sanitary Code* has been amended by adding regulations (15a, 15b, 15c) prohibiting cross connections between water supplies unless special precautions are taken to insure potability. Non-potable water in industrial plants shall also be rendered unavailable for drinking.

Many Meetings in Washington—January seems to be the open season for conferences in Washington. They came so fast that it was difficult to keep pace with them. First came a conference of directors of state divisions administering the Federal Maternity and Infancy Act, which was held by the U. S. Children's Bureau, January 11 to 13. On January 11 occurred a meeting of the professional sanitarians of Washington, D. C., to launch a District of Columbia Public Health Association. Then, from January 18 to 21 came the Women's Industrial Conference, sponsored by the U. S. Women's Bureau, though only one day was devoted to health. On January 19 the Surgeon General of the Public Health Service held a public meeting to receive the report of the committee on tetra-ethyl lead in gasoline. Finally, on January 20 and 21 the second National Recreation conference called by the President's Committee on Outdoor Recreation took place. The A.P.H.A. was informally represented at all of these.

CONVENTIONS

March 30, New York State Association of Public Health Laboratories, New York City.
April 2–3, American Association of Pathologists and Bacteriologists, Albany, N. Y.
April 3, American Association of Anatomists, New Haven, Conn.
April 15–16, Western Physiotherapy Association, Kansas City, Mo.
April 19–23, American Medical Association, Dallas, Texas.
April 27–29, Medical and Chirurgical Faculty of Maryland, Baltimore, Md.
May 3, American Society of Clinical Investigation, Atlantic City, N. J.
May 4–5, Association of American Physicians, Atlantic City, N. J.
May 5–7, American Urological Association, Boston, Mass.
May 10–14, New England Health Institute, Concord, N. H.
May 17–22, American Health Congress, Atlantic City, N. J.
May 17–22, American Child Health Association, Atlantic City, N. J.
May 17–22, Conference of State and Provincial Health Authorities of North America, Atlantic City, N. J.
May 17–22, Biennial Nursing Convention, Atlantic City, N. J.

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